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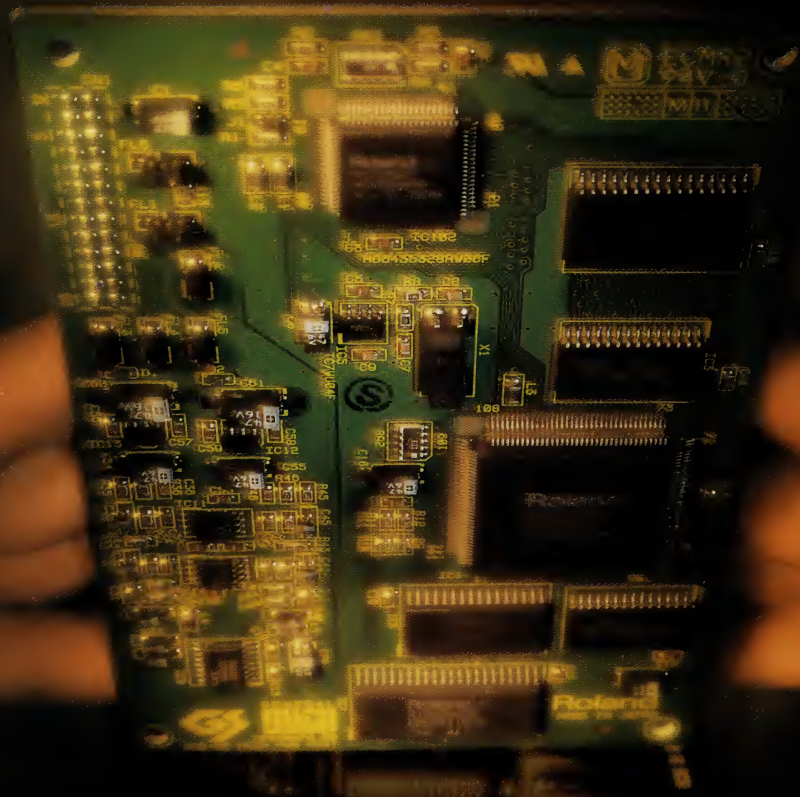
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READER SERVICE NO. 1

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"DOS IS DEAD"

— BILL GATES, OCTOBER 30, 1995

The interactive media business is too young to have sacred cows. The computer business is another story. To listen to the acolytes, computerland's many cows have attained demi-godhood. For the fundamentalist congregations of the various faiths, there is no middle ground. To worship in the wrong house is to be condemned to eternal system crashes, init conflicts, incompatible peripheral drivers, incomprehensible install routines.

Those devotees to any given high-tech deity don't easily surrender their beliefs, even when the object of their worship is cut down in a hail of pink slips, unfit to sustain the one ingredient essential to godhood: dominant marketshare. Amigaite still take umbrage at any mention that their platform is kaput. Atarish Europeans still hope to see the Falcon rise from the grave. NeXTolics have put their hardware to rest, but a select few still genuflect at the altar of Mr. Jobs' operating system. Legion are those who would draw blood at the suggestion that DOS sucks in comparison to the Mac OS and vice versa.

And if you're curious about what might happen when a practicing Macolite encounters a Windows envangelist armed with the gospel according to Bill, actually Microsoft's new collection of DirectX APIs otherwise known as the Win95 Game SDK, turn to page 22. You may be surprised at the outcome.

Surprise comes close to describing what I felt at Judgment Day, Microsoft's Halloween eve tradeshow/costume ball/Game SDK release party where a virtual chairman Gates, wandering through the halls of *Doom* blasting nasties with Eastwood-like nonchalance, announced the death of DOS at the hands of the aforementioned Win95 Game SDK and generally trashed the OS that made him one of the richest guys in the world. Wonders never cease.

What's with all this game stuff? Wondering why you should care, when your core business has nothing to do with games? You make reference discs? You're involved in distance learning, designing interactive corporate training courses, building Web sites for the kitchen business? In the words of the Microsoft Game SDK team, "It took games to enlighten us on how to do things right. The APIs we're developing can just as easily be applied to spreadsheets and other business apps. But game developers are pushing us to develop better video, better audio, better graphics."

We couldn't have said it better ourselves. The techniques and technologies used to develop cutting edge entertainment titles are just as useful in education and business situations. Philips' *Burn:Cycle* Web site, detailed in the case study on page 49, may be promotion for a game, but its pseudo animation techniques can be used to bring any kind of site to life.

If you're thinking there's about as much chance for Mark Giamb Bruno's Animata column on how to fake photorealistic space war visuals to have anything to do with your work as Bill Gates is likely to abandon the DOS operating system once and for all — well, stranger things have happened. . . .

Enjoy.

Dominic Milano
Editor

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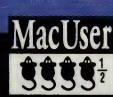
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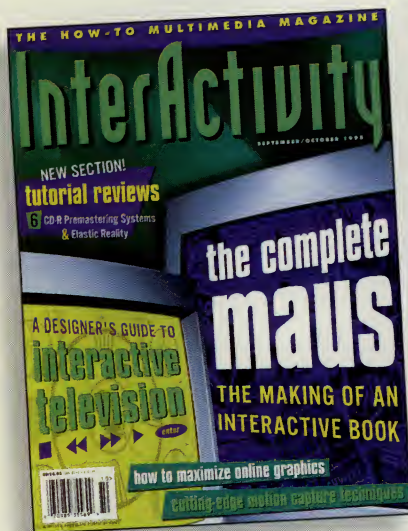
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P. O. V.



Kudofest Part 99

Despite fear of being just another redundant voice in the chorus of praise your magazine has been receiving recently, I thought I would forward my comments.

I bought the first issue and subscribed immediately. Besides being the strongest first issue I had ever seen in any magazine, the articles were nothing less than superb and courageously technical. But now the unbelievable: I just finished devouring issue number four and it's even better than the previous three.

The "How to Put Together an Internet Web Site" article, focusing on streamlining images, was right on the dot (or should I say pixel?). The Elastic Reality review/tutorial was extremely informative and has sold me on the program. Simon Knights' article on motion capture was honest and straightforward. And special thanks really must go to Chris Meyer's article on the alpha channel (I didn't have a clue what super black was before).

So far your publication, with its comprehensive coverage and diversity, has hit every one of my nails on the head. You've become my number one source for fascinating and applicable information on multimedia. Keep up the great work.

Charles K. Barnard
Art Director
Graphic Computer Solutions
Stockton, CA

Nothing To Hear

I read your third issue with great interest. Thanks for bringing out a nuts-and-bolts,

here's-how-we-did-it publication. Solid work. Now for the question: With all the work being done with 3D modeling, rendering, and scripting, what is happening with sound? I see very little mention of incorporating the latest audio techniques into multimedia. The discussion of music and sound effects in your third issue was higher than I generally see, but I'd like to know who is doing cutting edge *audio* just as much as I want to know the visual side.

Peter T. Sabin
Manager, Market Development
Audio-Technica U.S.

We are guilty of shying away from our audio heritage — discerning readers may have noted that a few of the people associated with InterActivity have been or are involved in publishing Guitar Player, Keyboard, Bass Player, and Music & Computers magazines — but we haven't completely forsaken it. David Javelosa's "Interactive Noise" column, our tutorial reviews, our case studies on titles, new gear blurbs, and just about every other element of the magazine has always included informed details on how digital audio and MIDI fit into the interactive equation. Multimedia would be monomedia without the sonic component, but it's our mission to pay attention to the integration of all media. So stay tuned. There's plenty of interesting stuff coming down the pike for interactive audiophiles to get into, including the following proposal based on the GamePC Consortium's ideas on interactive audio standards for PCs. We thought you might like to be in on the discussion. . . .

Discussions on the GamePC consortium's interactive audio standards include extensive support for streaming audio, while MIDI takes a backseat. Wavetable support is only a recommendation and downloadable sampled instruments simply aren't mentioned.

Why?

Don't get me wrong. I've seen some very impressive streaming audio implementations, impressive from both a technological and creative standpoint. Streaming audio will always be an important part of the audio solution. But there

are limitations to streaming audio, in particular its lack of flexibility. Realtime control over previously prepared audio is inherently limited. We do it because it's the only way to guarantee consistent, quality output. But musical input at real time is extremely limited.

The equivalent in graphics would be streaming animation. Of course, this is not what's done in graphics. As all of us in music and audio know (and we all have well-worn chips on our shoulders, don't we?), all the money goes into graphics technologies. Yet we understand how important and effective music and audio are. So, while we've worked on limited budgets, the graphics community has developed sophisticated object-oriented approaches to creating and rendering visuals that are composed on the fly, very real, and very virtual. So why are we stuck on the audio equivalent of playing MPEG video clips?

The technology to give us what we want is here, we just need to evangelize it and pull it together. We can get the exact same effect as streaming audio with a combination of MIDI and downloadable instruments. We need to promote a standard for this. It can start completely in software, as the good work from the likes of Miles, HMI, and Brooktree demonstrate. And, it can make its way into hardware in the long run, thereby easing demands on the processor. Creative Labs, Advanced Gravis, and Turtle Beach have already taken shots at this. Creative Labs has done the most with their SoundFont technology, but it's not an industry wide standard. I applaud them, though, for getting the word out.

A standard for downloadable samples needs to be broad enough to support everything from streaming audio to musical instruments and designed to fit into the largest range of configurations possible. While HMI, Miles, and Brooktree should all be in the position to deliver software solutions for such a standard, Creative, Ensoniq, and other hardware vendors should be delivering hardware solutions.

Once that's accomplished, once developers know they can count on a consistent solution (which is one reason why software solutions are so important), we're all going to have a much broader palette to work with. And, I promise you, there are some very cool and exciting things that can be done with music and audio once the doors open wide. This is not pie in the sky. The technology is here, now, and will be that much stronger in a year.

Having said all this, perhaps I should explain what I'm referring to.

The GamePC spec requires:

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Clearly, streaming audio is important. Meanwhile, wavetable MIDI is an option:

- Have wavetable synthesis (General MIDI compatible).

Yet, a MIDI interface is required.

- Have MIDI serial interface.

Am I missing something?

If I understand correctly, the reason a lot of people don't use MIDI is that they can't rely on the sound quality, whereas they can count on dumping streaming audio to just about any soundcard. The Fat Man has helped with his campaign for more consistency within General MIDI. But as long as wavetable synthesis is only recommended, not required, his goal is thwarted. Then the requirement of a MIDI serial interface throws me. Perhaps it's referring

to the proliferation of WaveBlaster-compatible upgrade cards, in which case it makes some sense because it leaves the doors open for wavetable synthesis.

I find the IMA recommendations more appropriate, which require:

- PC audio requirements.
- General MIDI compliance.
- Wavetable synthesis.
- Maximum total CPU overhead for digital audio and wavetable synthesis = 20%.
- Maximum total CPU overhead with 3D = 25% (digital audio + wavetable + 3D).
- Minimum mixing channels = 6, recommendation = 10.
- Digital audio formats: 8-bit, 16-bit, u-Law compression, IMA ADPCM compression.
- Digital audio sample rates: 11.025kHz, 22.05kHz, 44.1kHz.
- MIDI serial interface.
- DirectSound compliance.

Even this doesn't ensure a platform with downloadable sampled instruments. But it's got DirectSound, wavetable synthesis, and a CPU

overhead expectation for digital audio mixing, so it's very, very close.

Okay, I'll shut up. I'm very interested to see what other people's thoughts are. It seems to me that this is our chance to architect better standards for the future instead of continuing to retrofit for the short-sightedness of the past.

Todor Fay
Blue Ribbon SoundWorks
Atlanta, GA

Bottleneck Slide

The article on the bandwidth bottleneck [*InterActivity*, Sept./Oct. '95] is right on target. Thank you. An additional alternative to consider is using gray-scale or two-color versions of graphics. You hint at this in the suggestion to "reduce the color depth to 8 bits or less." A nicely dithered two-color image can often do quite nicely in about one-eighth of the space. The two colors needn't be black and white — though perhaps they should be picked from the 16 standard Windows colors. And you can often pick up a bit more compression using a fixed dithering

Continued on Page 90

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Q: *I have some questions about the article "How To Build An Internet Web Site: An HTML Primer" by Larry O'Brien (May/June '95). In Step 3 he states you need an Ethernet and K1 Card. Step 4 says to get an ISDN line. If you get the Ethernet/K1 card, do you still need to get the ISDN line? He goes on in Step 7 to say an Internet feed is required. Now assuming I use the Ethernet/K1 card with the ISDN line, how do I connect to someone on the other end? Also, will I need an account, and if so, what type of account will I need? I'd like to know this because it sounds really interesting, and sometime in the near future I'd like to run my own WWW site.*

A: Larry O'Brien responds: I'm glad someone asked about this, as it gives me a chance to clear up a brain seizure of mine. K1? What I meant was NT1. To answer the question, though, the answer is yes, you need both new hardware in your computer (such as an ISDN modem) and new services from your telephone company (an ISDN line).

As for hooking up to someone on the other end, apparently I wasn't precise about this. You will need an account with *someone* who has the bandwidth to spare and who is willing to give you that bandwidth at a reasonable cost. The prices commercial Internet access providers (IAPs) charge for the necessary 56k, full-time connections are rapidly dropping into the low hundreds of dollars per month, but to fulfill the dream of having enough money left over for pizza, you'll have to sidestep the IAPs and go for some kind of friendly partnership with a network administrator at a local college or at a company big enough to have a WAN but not big enough to have draconian oversight.

Q: *I'm interested in taking classes in multimedia. What do you recommend?*

A: This raises another question: While the field of interactive media grows in leaps and bounds, will educators and students be able to keep up? Interactive multimedia education takes diverse paths. Programs of various levels are offered through continuing education classes at city colleges and state universities, through professional associations, and through specialized training centers. Of course, you can even DIY (do it yourself) if you have the patience of a martyr and the time. Depending on your needs (do you have a day job? do you want a comprehensive course load or just a few classes?), one or more of these options will fit the bill. Be careful when looking at programs to be sure they offer enough classes each semester/quarter to fill your needs and interests. Many schools are slapping together a "multimedia program," which may be only

a handful of classes without the optimal depth and breadth.

The most well known and highly regarded schools include San Francisco State University's Multimedia Studies Program, California State University at Long Beach's Advanced Media Production Center, and the University of California at Los Angeles' Extension classes in multimedia. By no small coincidence, all three are located in two hot spots for multimedia production: San Francisco and Los Angeles. On the East Coast, one of the best places to check out is New York University. Boasting a Media Research Lab dedicated to the interdisciplinary research of emerging media and communication technologies, NYU offers a rich collection of resources. The Lab is an outgrowth of the Computer Science Department and offers both a graduate program in disciplines such as procedural animation and multiscale user interfaces, and spon-



sors special projects for undergraduate computer science majors.

One of the real assets of SFSU and UCLA is their industry connections. Both programs offer classes with working professionals who bring practical knowledge to their students, and the schools offer networking possibilities and job contacts. At SFSU, students follow a rigorous 30-credit certificate program that includes classes in writing, authoring, education and training, and business practices. An interesting side note is that the average age at SFSU is 35 — many students are going through a job transition, and it is possible to take classes more casually without obtaining the certificate. CSU Long Beach offers powerful equipment in their lab as a benefit to their continuing education students. SGI workstations running SoftImage, Wavefront, and ElectroGIG are available. For all three of these schools (UCLA, CSULB, and SFSU), anyone can

enroll in classes as a continuing education student. In fact, only SFSU offers a certificate in completion of their program.

At the undergraduate level, a few colleges are beginning to offer majors in multimedia, creating interdisciplinary studies somewhere between communications and computer science. One is Columbia College in Chicago. Another is Cogswell Polytechnical, located in Santa Clara, California. In the heart of Silicon Valley, this technical institute offers a bachelor of arts degree in computer and video imaging.

Training institutes are flourishing and probably exist in your hometown if you know where to look. Organizations such as Bay Area Video Coalition (BAVC) in San Francisco and ICARI in Montreal offer hands-on video training in Premiere or 2D and 3D animation, respectively.

Conferences offer another type of resource. Software vendors and multimedia conferences, such as Siggraph, offer classes that provide quick, one-day (or shorter) sessions on topics such as programming, authoring, and animation. The Macromedia International User Conference and Autodesk University are two other possibilities. While you save time with this approach, you may spend more in the time-vs.-cost ratio.

We'll provide more comprehensive information on educational programs and training options in an upcoming issue. Here's the contact information for the schools mentioned above: **College of Extended Learning**, San Francisco State University Downtown Center, 425 Market St., 2nd Fl., San Francisco, CA 94105; vox 415.904.7700; fax 415.904.7760. **Department of Entertainment Studies and Performing Arts**, UCLA Extension, 10995 Le Conte Ave., Rm. 437, Los Angeles, CA 90024; vox 310.825.9064. **Media Research Laboratory**, New York University, 715-719 Broadway, 12th Fl., New York, NY 10003; vox 212.998.3384; fax 212.995.4122; email media@cs.nyu.edu; http://found.cs.nyu.edu/MRL. **Bay Area Video Coalition**, 1111 17th St., San Francisco, CA 94107; vox 415.861.3282. **Advanced Media Production Center**, California State University Long Beach, 1240 Bellflower Blvd., Long Beach, CA 90840; vox 310.985.4352; fax 310.985.5292; email ampc@csulb.edu. **ICARI Inc.**, 2070 Clark St., Ste. 402, Montreal, Quebec, M2X 2R7 Canada; vox 514.982.0922; fax 514.982.0288. **Cogswell Polytechnical College**, 1175 Bordeaux Dr., Sunnyvale, CA 94089; vox 408.541.0100; fax 408.541-0764; email 618-3314@mcimail.com. **Columbia College of Chicago**, 600 S. Michigan Ave., Chicago, IL 60605; vox 312.663.1600 x5130; fax 312.663.5543. ☛

GOT A QUESTION?

Send it to Erica Smith at faqs@mfi.com

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READER SERVICE NO. 7

R U N

Compiled by Erica Smith

Rumor Has It

The **Interactive Multimedia Association (IMA)** announced the formation of **Uniform Labels for Multimedia Titles**. It's an attempt to standardize the lingo of system configuration requirements so consumers can more easily pick CD-ROM titles that will run properly on their system. . . . Copyrights, trademarks, and patents will be the subject when the IMA presents a forum with the U.S. Copyright Office on **Technology-Based Intellectual Property Management**. The event will take place Jan. 10, 1996, in Washington, DC. Associations, developers, and others have been invited to submit requirements for the control and licensing of digital content and processes. . . . And, on that note, the U.S. Commerce Department's Working Group on Intellectual Property Rights released a report on **Intellectual Property and the National Information Infrastructure**. The study found that U.S. copyright laws are too lax and must be updated to protect digital intellectual property. . . . Who says Congress has no influence? During the national ruckus over censorship on the Net, a group of 21 publishers, software firms, telecommunications companies, and Internet and online service providers have joined to develop a platform, to be called **PICS (Platform for Internet Content Selection)**, which will give users the power to filter out the online content they don't want. The Information Highway Parental Empowerment Group (IHPEG) with the backing of Microsoft, Netscape, and Progressive Networks was the driving force. Their hope is to develop ratings systems for the Internet, and, ideally, provide ways that access to certain selected content can be blocked. . . . Two California men were indicted by a federal grand jury for **fraud and copyright infringement**. They allegedly sold and attempted to sell the copyright and distribution rights to CD-ROM discs containing datasets that had been copied from copyrighted works of Viewpoint DataLabs in Orem, Utah. They were charged with two counts of mail fraud, five counts of wire fraud, one count of inducing interstate travel to defraud, and three counts of copyright infringement. . . . **The Writer's Guild of America** has opened a multimedia branch in

Continued on page 14

StarSightedness

BY ILYSSE RIMALOVSKI

People gripe that there isn't anything to watch on TV, yet the average cable system offers more than 12,000 program choices each week on more than 40 channels. Maybe it's just that the user interfaces currently available make it too difficult to find that captivating nature show, NCAA tip-off, or mindless sitcom rerun.

That's what StarSight Telecast is betting. Their research reveals that the scrolling onscreen TV guides we've grown accustomed to are more futile than utile. Furthermore, that aging joke about the flashing 12:00 on the VCR gets more pathetic when we learn that 70% of VCR owners still cannot tape a program successfully on their own machine.

With a mission to provide "the fastest way to find out what's on TV and the

easiest way to record it," StarSight Telecast was launched in 1986 by Michael Faber. His goal was to create an unprecedented onscreen interactive electronic television program guide with one-button VCR recording.

Nine years later, with 113 employees, an executive management shuffle, and a healthy infusion of support from equity partners Viacom, Cox Communications, Tribune Co., Time Warner, and the Providence Journal, the first StarSight-equipped televisions, VCRs, and settop boxes are hitting the stores with more to follow later this year. And, so far, Star-

STARSIGHT						
SEP	MON	TUE	WED	THU	FRI	SAT SUN
7	8:00P		8:30P			9:00P
CNN	Primenevs					Larry King
SHOW	City Slickers					
HBO		Primenevs				
DISC		1 hour long				
26	ONCE					
ESPN	DAILY (M-F)					
FAM	WEEKLY					
4	Fresh Prince Blossom					In the Best
DISN	Avonlea					Casablanca
REQ	The Prince of Tides					Juice
HBO	HOME BOX	CBL 2		7:30P		MON SEP 7

Sight has emerged as the leader with a three-tiered strategy that encompasses the retail, wholesale, and licensing markets.

To date, 11 major consumer-electronics manufacturers have signed licensing agreements to incorporate the StarSight system into their products. These companies serve more than 80% of all U.S. households and include Daewoo Electronics, Goldstar, Magnavox, Mitsubishi, Panasonic, RCA, Samsung, Sharp, Sony, Toshiba, and Zenith.

StarSight's commitment is impressive, especially because it's still unclear how quickly consumers will embrace the notion of interactive TV, never mind paying for on-screen program guides to help them navigate through the ever-increasing number of channels. But with the technology in place, StarSight believes they will be able to engage the masses and propel the industry forward in ways we may not have considered.

Insight Inside

Four years of prototyping since the product's inception have yielded approximately 10 different releases with only minor tweaks along the way. Ken Milnes, vice president of engineering, discussed the changes, which include a cleaned-up font, a more graphical user interface, customizable recording, and more cable-specific features. Suggestions for enhancements are collected by StarSight's customer service representatives — many enhancements have already been implemented, such as more descriptive program titles, re-run designation, and the ability to record a full night of TV programming.

A complicated database at the foundation of StarSight's services required some

T I M E

custom coding assembled in C. StarSight's proprietary system is based on an Informix database with a Windows interface using PowerBuilder to determine customized channel line-ups, ordering, and related system functions. Engineers faced further constraints of compacting large amounts of data within a small amount of memory, confined to hardware that had to be inexpensive from a consumer standpoint.

How It Works

StarSight is available throughout the United States by subscription to TV viewers whether they receive programming by cable, satellite, or over the air. In the home, it is received through a chip planted in new-generation TVs, VCRs, cable TV, and satellite decoder boxes. For those still faithful to electronics manufactured pre-StarSight, a standalone receiver is available for \$99.

The interface is a familiar grid format displaying seven days of programming. Depending upon the system in place, the grid describes either 1.5 or 2.5 hours worth of programming information at a glance. The guide sorts listings by name, time, date, or theme aided by a universal remote with specialized features.

To update the system with current information, users must designate a time period spanning six hours during which the data is downloaded from the local PBS station. Subscribers can execute this process while watching television, but only if they are tuned to a station that transmits StarSight's data. (In addition to PBS stations, Viacom-owned MTV and Nickelodeon now carry StarSight's transmission in their datastreams). Failure to update a system results in blank boxes depicted on the grid.

To activate the system, subscribers call an 800 number and tell StarSight's customer service representatives which cable provider they're using. Then StarSight will send the appropriate channel map to unlock the service. By pressing a button on the remote control, you can ensure that only receivable channels are loaded into your system.

Remote Control

"This is a TV product, not a computer product," Milnes notes. "To the average viewer, a mouse or keyboard is not practical, especially because there is no surface to act as a proper foundation." While he speculates that over time the TV may compete with the computer, StarSight's main thrust is TV, with a careful eye toward keeping the user interface simple and direct.

Each cable system or receiver manufacturer designs their own remote control to navigate StarSight. A set of optional buttons allows for custom design and functionality. For example, a viewer can program and rearrange a list of channels, eliminating those that are never watched.

Typically, a viewer uses the remote to highlight a listing within the grid guide. To learn more about a show that's interesting, the STAR button pops up a window describing the program's length and a summary of its contents. The pop-up menus are displayed onscreen in two to five seconds depending upon the feature. The TUNE button tunes to the highlighted channel. Use the GUIDE button to move through the schedule. Use the THEME button to choose programs by category. The RECord function requires just one press of a button to program a VCR to record the highlighted show.

Zenith offers a trackball-controlled remote, a more tactile navigation experience, supported by looking at the TV screen itself for feedback.

Sorting Data

StarSight's data is supplied by the TV Data Technology Center in Glen

Viewers can sort through StarSight's programming guide by searching listings by THEME using an onscreen menu. Categories such as MOVIES then branch into DRAMA or ACTION/ADVENTURE. StarSight believes that as the number of channels multiplies beyond what the typical user can remember, programming will need to be accessible by content or title. Themes include:

- | | |
|-----------------------------|-------------------------|
| ▶ Movies | ▶ Entertainment/Variety |
| ▶ Specials/Miniseries | ▶ Comedy |
| ▶ Sports | ▶ Action/Mystery/Horror |
| ▶ Children's Programming | ▶ Drama/Romance |
| ▶ Health/Science/ Education | ▶ Miscellaneous |
| ▶ News/Talk/Magazines | |

Falls, New York, which transmits continuously updated information to StarSight's headquarters in Fremont, California, using a 56Kbits/sec dedicated data line. The data is then formatted for the television screen and sent to the Public Broadcasting Service Network Control Center in Alexandria, Virginia.


Here, the data is inserted into the outgoing PBS VBI (vertical blanking interval), uplinked, then downlinked to achieve coverage for virtually all U.S. households. The PBS satellite transmits data for all localities, but the local PBS channel accepts what's needed and rejects the rest, thereby reducing the amount of data — from 10MB for the country, to 1MB for the station, to 250MB to 330MB for the region depending on the cable system. Then, StarSight hardware filters the data, converts it to a 960 bits/sec data rate, and rebroadcasts to StarSight subscriber units in its area. The datastream is broken up by channel and day so that the subscriber unit collects only what it needs, then stores the relevant information.

Tech Support

The printed manuals explaining how to set up and use the StarSight system are highly illustrated and simply stated in nontechnical terms. Onscreen, a demo mode with dummy data familiarizes new subscribers with the system.

Presently, StarSight's customer service reps are easily handling their load, gearing up as the subscriber base begins to swell. They monitor the more than 17,000 cable companies in their database so when new subscribers set up the StarSight system, they will receive the appropriate channel mapping information. VCR users, in particular, have required little maintenance, a credit to the high ease-of-use of the product.

Perhaps the most nagging issue for the company itself is the misconception that StarSight is a cable provider—easily misconstrued as the lines between hardware, software, and services continue to blur.

For a free 30-day trial subscription and a \$99.99 standalone box, contact StarSight; vox 800.643.7827, 510. 657.9900; fax 800.229.9640, 510.657.7501. 

Ilyse Rimalovski is a contributing editor of *InterActivity* and creative director of Siren New Media. Email her at interactivity@mfi.com.

Rumor Has It

San Jose to nurture alliances between multimedia writers and developers. . . . **Sony/Phillips** and **Toshiba/Time Warner** called a truce and settled on one DVD (digital video disc) player standard, garnering the approval of the Technical Working Group and the Motion Picture Advisory Committee. With 4.7GB of space available translating into 133 minutes of film, DVD will be backward compatible with CD-ROM, CD audio, CD-I, Photo CD, and CD Video. As we go to press, the companies may be agreeing to merge their efforts, but they hadn't agreed on the specifics yet, nor was it clear when the players would be available and at what price. . . . **Brøderbund** has merged with **The Learning Company** to heat up the competition in the children's and reference multimedia markets. The two companies have been competing with each other in the edutainment category; now they will be the fourth largest consumer software company. . . . **DreamWorks Interactive**, a Microsoft/DreamWorks joint effort, has joined forces with **Scholastic** for a title development deal. Their first title will be a CD-ROM based on the R.L. Stine children's books called *Goosebumps*. . . . **Microsoft** has acquired **Blue Ribbon Soundworks**, a developer of interactive music authoring products for multimedia PCs. Microsoft will provide distribution and technical support for current Blue Ribbon tools but will eventually integrate them into Microsoft titles. Soundworks products include AudioActive, SuperJAM, Melody Maestro, and AudioTracks Professional. . . . On the eve of releasing *11th Hour*, the sequel to their million-plus seller *7th Guest*, **Trilobyte** is immersed in developing three other titles, including an interactive movie starring John Hurt. Stay tuned for details. . . . **The Residents'** next interactive opus is due out any minute. Developed by 3D artist Jim Ludtke, *Bad Day on the Midway* includes works by comic book artists and modern sculptors incorporated in a 3D amusement park built in Macromodel. . . . Keep a lookout for another **Inscape** interactive title, *The Dark Eye* — a collection of Poe stories told with animated puppets. 🐾

Sites to Surf on the World Wide Web



capturing the voice of the Net, **Votelink** (<http://www.votelink.com>) was launched recently to poll Net users on international, national, and local issues. With plans to provide weekly questions in cities in all 50 states by mid-1996, Votelink will have plenty of fodder during election time. The site allows voters to review both the pros and cons of issues, add their own comments, and enter into dialog with other users. . . . A sign that soon everyone will have their own homepage, **Creating Cool Web Pages with HTML** published by IDG Books provides how-to instructions for HTML and assistance with marketing and design. . . . Learn more about multimedia at the **Multimediautor** site launched by Electric Eye Multimedia in Toronto (<http://www.ideaguy.com>). The site includes a guide to various multimedia resources, a list of Canadian developers, and articles. . . . A new study released by **Goldman, Sachs and Company** estimates that paying consumers with access to the Web will number nine million by year-end 1995. In 1994 there were fewer than one million users. Estimates for 1996 are 22-25 million, tripling over the last year's figures. . . . Web site owners can now receive reports of Web site usage through **I/AUDIT**, the first company to provide independent audits of hits to a Web page. Already signed on to the service are Yahoo!, Playboy Enterprises, CMP's TechWeb, Netscape, and the Internet Shopping Network. 🐾

IBM Aims High For Authoring Tool

IBM and AimTech announced a joint development and marketing agreement for IconAuthor, AimTech's cross-platform, multimedia authoring tool. By combining forces, AimTech gains the marketing muscle of IBM, and IBM has a chance to upgrade IconAuthor for OS/2. Details on the financial agreement were vague, but assumedly AimTech will reap some kind of financial reward besides higher sales.

The interesting twist here is the role of IBM's Software Solutions team. They were instrumental in the agreement and will work with AimTech to develop enhancements. They also plan on keeping the lines of communication open between AimTech's and IBM's programming teams. The IBM Solutions team was already using IconAuthor for its internal and external multimedia development — CBT programs for IBM employees and presentations created by IBM's customers — so a cross-fertilization of ideas and requirements for the system can now take place during development.

Planned enhancements for AimTech's IconAuthor include Internet application deployment, integrating with kiosk device drivers, enhancing color management, and interactive television applications.

Says Andy Huffman, president and CEO of AimTech, "We're going to drive a lot of our strategic direction based on input from IBM as they build real solutions for a variety of applications, such as distance learning."

Looking to the future, an OS/9 version for authoring interactive television applications is planned for 1996 as well as a native 32-bit version for the OS/2 platform. 🐾

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READER SERVICE NO. 8

NEW GEAR

Compiled by Ted Greenwald and Kathleen Maher

As the 3D MPEG-Encoded Sphere Turns...

Matrox is accommodating the mercurial world of multimedia by adding slots for two daughter cards to their MGA Millennium series graphics boards for the PC (2MB \$379, 4MB \$549). The first three add-ons are MediaXL (\$249) for video playback and frame grabbing, the MediaXL-MPEG (\$349), and the Media TV tuner (\$149). MediaXL captures NTSC, PAL, or Secam singles in Y/C or composite. MediaXL-MPEG adds hardware MPEG playback. Frames can be played back at 1024x768 resolution, 60 frames per second. The Media TV tuner connects to a TV antenna or cable to feed signals into the capture hardware.

Matrox currently supports all 3D APIs including Microsoft's Direct3D — clearly Matrox' bet for the 3D API of the future — even though it will not be incorporated into Win95 until early 1996. Until then, highend developers can use OpenGL in Windows NT and Intel's 3DR for Windows 3.1 (the developer's choice by virtue of its free distribution).

Speaking of 3D, Apple's long-awaited implementation of QuickDraw 3D has made the Mac more attractive to software developers and, apparently, to Matrox as well. Previously associated with the PC market, the company has added a Power Mac accelerator to the Millennium line. The PCI board, with 4MB or 8MB, starts at \$569 and allows users to work in 24-bit color at resolutions up to 1280x1024. Samsung's new Window RAM memory is in-

cluded to process drawing and screen refresh simultaneously.

Matrox, 1055 St. Regis Blvd., Dorval, PQ H9P2T4, Canada; vox 800.361.4903, 514.685.2630; fax 514.685.2630.

Reader Service #100

World Wide Worldwide

The market for interactive media is global, and the Web is literally worldwide. So why is English the dominant language of cyberspace? Much of the reason, certainly, is technological. Desktop computers are optimized for one language or another. Word processors arrange type from left to right but not vice versa. And most document formats accommodate only one character set at a time.

Hoping to internationalize electronic communication, Accent offers a six-program software suite for multilingual online communication: an HTML authoring tool, a viewer, a browser, and an email reader (prices not available). Beta versions can be downloaded from <http://www.accentsoft.com/>.

The authoring tool enables the creation of Web content in more than 30 languages independent of the location or localization of the Windows operating system. Accent's viewer works with other browsers as a helper application to enable viewing of multilingual content. The multilingual browser, which also functions as an add-on to browsers by Netscape, Spyglass, Spry, and Netcom, automatically displays the language in which a site was authored and en-

ables the user to select a language if several are available. The email application, which also functions as an add-on to cc:Mail, MS Mail, and GroupWise, performs similar functions.

Accent, 28 Pierre Koenig St., Jerusalem 93469, Israel; vox 972.279.3723; fax 972.2793.731; email normank@accent.co.il.

Reader Service #101

ITV Ground Zero

In a bid to forge an industry-standard foundation for the future of ITV, settop box maker Scientific-Atlanta has formed PowerTV, a division devoted to multimedia software and silicon. PowerTV's flagship offering is an operating system of the same name specifically designed for settop applications, available to all interested vendors (price not available).

The OS's emphasis is on cross-media, cross-platform development. It is designed to provide adequate application speed and media processing for games, compatibility with a variety of multimedia authoring systems, hardware independence via a rich set of access and control interfaces, and modular, scalable architecture that can be tailored to suit a variety of needs. Modules can be downloaded across the network to adapt to changing trends in ITV.

The OS's features include 32-bit architecture; a fully preemptive, multi-threaded kernel optimized for RISC processors; support for multiple, simultaneously executing applications; interactive TV network signaling and application networking through standard TCP/IP



Desktop Motion Capture

Motion capture and analysis — in real time, no less — has reached the desktop. An early example, recently demonstrated at San Francisco's Multimedia West, is Face Tracker RT from Motion Analysis (price unavailable), which runs on a pair of PCs to capture an actor's facial movements. Face Tracker dedicates a computer to motion-to-data conversion while a second machine computes the animation.

The relatively low cost of Motion Analysis' system suggests that virtual actors and digital puppets are viable for such low-budget applications as local entertainment and live performances on the World Wide Web. The company is working on a portable system built for on-location use.

Motion Analysis, 3617 Westwind Blvd., Santa Rosa, CA 95403; vox 707.579.6500; fax 707.526.0629; email dean@macorp.com.

Reader Service #102

REQUIRED

Name _____

Title _____

Company _____

Street Address/Mail Stop _____

City _____ State _____

Province _____ Zip/Postal Code _____

Telephone _____ Fax Number _____

Internet/Email Address _____

May we contact you via Email? ☐ Yes ☐ No

If you prefer delivery to your home, please complete home address information below. Company name and address are still required to qualify.

Home Address/P.O. Box _____

City _____

State _____ Prov. _____ Zip/Postal Code _____

Please answer all questions, sign and date the card. Incomplete forms cannot be processed.

☐ **YES!** I want to receive/continue to receive my FREE InterActivity subscription! ☐ No

Signature (required) _____

Date (required) _____

1 Do you develop or manage the development of multimedia products/services?

☐ Yes ☐ No

2 What is your organization's primary business activity? (check only one)

- ☐ 01 Media (Broadcast, Cable, Film, Publishing, Music)
- ☐ 02 Digital Entertainment (Cartridge/PC/Arcade Games, Location-based)
- ☐ 03 Advertising/Marketing/Public Relations/Communications
- ☐ 04 Education/Training
- ☐ 05 Multimedia Development/Production
- ☐ 06 Graphic Design/Art/Photo/Service Bureau
- ☐ 07 Audio Recording/Engineering
- ☐ 08 Online Service Provider (Networking, Content, Software)
- ☐ 09 Multimedia Dealer/Retailer/Distributor/VAR/VAD
- ☐ 10 Computer/Peripherals Manufacturing
- ☐ 11 Manufacturing/Process Industry (Non-computers/peripherals)
- ☐ 12 Computer Software/Tool Development
- ☐ 13 Research & Development
- ☐ 14 Government/Military
- ☐ 15 Professional Services Company (Finance, Legal, Health Care, Real Estate)
- ☐ 19 Other (please specify) _____

3 What term best describes your function? (check only one)

- ☐ 20 Executive Producer/Director
- ☐ 21 Creative/Art Management
- ☐ 22 Video/Film Director
- ☐ 23 Animation Design
- ☐ 24 Software Developer/Engineer
- ☐ 25 Script Writer/Editor
- ☐ 26 Designer (Interface, Screen, Graphics, Illustration)
- ☐ 34 Music/Audio Production (Musician, Composer, Engineer, Producer)
- ☐ 27 Educator/Training Specialist
- ☐ 28 Production Management
- ☐ 29 Post Production
- ☐ 30 Executive Management
- ☐ 31 Sales/Marketing Management
- ☐ 32 Information Technology Management
- ☐ 33 Consultant
- ☐ 39 Other (please specify) _____

4 What types of products/services does your firm develop? (check all that apply)

- ☐ 01 Entertainment (Games)
- ☐ 02 Entertainment (Non-Games)
- ☐ 03 Interactive Marketing
- ☐ 04 Interactive Training
- ☐ 05 Interactive Education
- ☐ 06 Interactive Sales/Presentations
- ☐ 07 Interactive Shopping
- ☐ 08 Information-based (Publications, News Services, Public Service, etc.)
- ☐ 09 Other (please specify) _____
- ☐ 29 None of the above

5 How many multimedia products/services does your firm develop annually? (check all that apply)

	Titles	Services	Presentations	Other
More than 100	<input type="checkbox"/> 01	<input type="checkbox"/> 06	<input type="checkbox"/> 11	<input type="checkbox"/> 16
26 to 100	<input type="checkbox"/> 02	<input type="checkbox"/> 07	<input type="checkbox"/> 12	<input type="checkbox"/> 17
11 to 25	<input type="checkbox"/> 03	<input type="checkbox"/> 08	<input type="checkbox"/> 13	<input type="checkbox"/> 18
1 to 10	<input type="checkbox"/> 04	<input type="checkbox"/> 09	<input type="checkbox"/> 14	<input type="checkbox"/> 19
None	<input type="checkbox"/> 05	<input type="checkbox"/> 10	<input type="checkbox"/> 15	<input type="checkbox"/> 20
	<input type="checkbox"/> 29 None of the above			

6 For which platforms/environments does your firm develop? (check all that apply)

- ☐ 01 CD-ROM
- ☐ 02 CD-I
- ☐ 03 Commercial Online Services
- ☐ 04 Internet/World Wide Web
- ☐ 05 8 to 64-bit Game Players
- ☐ 06 Arcade-based Games
- ☐ 07 Location-based Entertainment
- ☐ 08 Kiosks
- ☐ 09 Motion Pictures
- ☐ 10 Cable/Broadcast Television
- ☐ 11 DOS
- ☐ 12 Windows
- ☐ 13 Macintosh
- ☐ 14 OS/2
- ☐ 15 UNIX
- ☐ 16 Other (please specify) _____
- ☐ 29 None of the above

7 Which hardware products do you specify, authorize, or recommend for purchase? (check all that apply)

- ☐ 20 PC-compatible Desktops
- ☐ 21 Macintosh Desktops
- ☐ 22 Workstations (SGI, SUN, DEC, HP, IBM)
- ☐ 23 LCD Projection Panels
- ☐ 24 Audio/MIDI Boards
- ☐ 25 Graphic Accelerators
- ☐ 26 Compression/Decompression
- ☐ 27 Compact Disc Recorders

- ☐ 28 Printers
- ☐ 29 Video/Film Post Production Equipment
- ☐ 30 PC-compatible Laptops
- ☐ 31 Macintosh Laptops
- ☐ 32 Monitors
- ☐ 33 Storage Devices (Optical, Hard Drive, Tape Drive)
- ☐ 34 Video Capture/Playback
- ☐ 35 Compact Disc Players
- ☐ 36 Scanners
- ☐ 37 Audio Recording/Engineering Equipment
- ☐ 38 Other Peripherals
- ☐ 39 Other (please specify) _____
- ☐ 59 None of the above

8 Which software products do you specify, authorize, or recommend for purchase? (check all that apply)

- ☐ 51 Internet Server/Browsers
- ☐ 52 Sound Editing
- ☐ 53 Animation
- ☐ 54 Image Manipulation/Photo Enhancement
- ☐ 55 Presentation
- ☐ 56 Search/Retrieval
- ☐ 57 Archival Media (Images, Sound, Animation, Film, Text)
- ☐ 58 Authoring Tools
- ☐ 59 Video Editing
- ☐ 60 2D/3D Rendering/Modeling
- ☐ 61 Draw/Paint Tools
- ☐ 62 Formatting/Mastering
- ☐ 63 Programming Languages
- ☐ 64 Other (please specify) _____
- ☐ 79 None of the above

9 What is your firm's total annual budget for multimedia-related hardware/software purchases? (check one from each column)

	H/W & Peripherals	S/W
Over 1 Million	<input type="checkbox"/> 01	<input type="checkbox"/> 10
\$500,000 - \$999,999	<input type="checkbox"/> 02	<input type="checkbox"/> 11
\$250,000 - \$499,999	<input type="checkbox"/> 03	<input type="checkbox"/> 12
\$100,000 - \$249,999	<input type="checkbox"/> 04	<input type="checkbox"/> 13
\$50,000 - \$99,999	<input type="checkbox"/> 05	<input type="checkbox"/> 14
\$25,000 - \$49,999	<input type="checkbox"/> 06	<input type="checkbox"/> 15
\$10,000 - \$24,999	<input type="checkbox"/> 07	<input type="checkbox"/> 16
\$5,000 - \$9,999	<input type="checkbox"/> 08	<input type="checkbox"/> 17
Less than \$5,000	<input type="checkbox"/> 09	<input type="checkbox"/> 18

10 How many people are employed in your entire firm, including all branches, subsidiaries, and locations? (check only one)

- ☐ 1 1,000 or more
- ☐ 2 500-999
- ☐ 3 100-499
- ☐ 4 25-99
- ☐ 5 Less than 25

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MULTIMEDIA ACCELERATION► for Windows 95

protocols; and support for polyphonic PCM audio, video overlay and capture, and anti-aliased and bitmap fonts. The entire system resides within 512kB and is extensible for vendor-specific add-ons.

Reportedly Oracle, MediaNet, Scala, and Sybase are making their multimedia runtime engines run on PowerTV. This ought to encourage developers using systems from these manufacturers to create ITV applications and enable them to port existing content to ITV with minimal difficulty. In addition, Metrowerks is working on development tools for the Macintosh, while Diab Data is working on similar software for the PC. Plans for Unix are in the works.

Concurrently, PowerTV announced the Eagle multimedia ASIC. The chip is designed to integrate multimedia capabilities into cable or broadband digital settop systems and replaces several chips currently used in such equipment. Optimized for use with the new OS, it accelerates several functions usually accomplished in software and enables other functions not possible in software. Eagle supports graphics acceleration, audio mixing, and video scaling, as well as graphics/video compositing, sprite animation, and Alpha blending and anti-aliasing of graphics and video.

PowerTV, 20833 Stevens Creek Blvd., Ste. 100, Cupertino, CA 95014; vox 408.777.7560; fax 408.777.0176; email jeana@powertv.com; <http://www.powertv.com>.

Reader Service #103

The Big Squeeze

Claiming image quality comparable to that of VHS, Motion Pixels has introduced a software-only video compression scheme that provides full-screen, full-motion compression running on an IBM 486 computer (price not available). Demo copies can be downloaded from <http://www.motionpixels.com/>.

Adjustable parameters include color subsampling, interframe compression, background filtering, and gamma color correction. Processing time and file size varies widely depending on the original material. For playback, the system offers 12 resizing options (including enlargement of up to nine times); color choices of 256, 32k, and grayscale; and screen resolution ranging from 320x200 to 1024x768. According to the company, the picture can be enlarged four times with no loss of quality or pixel-doubling artifacts. The playback module, which comes in versions for Video for Windows and interactive applications, runs under Windows 3.1, Windows for



Nvidia's NV1 multimedia acceleration chip supports Windows 95's DirectInput API for digital game controllers.

Windows 95's DirectInput API for digital game controllers. The enhanced performance they afford should give developers additional incentive to take advantage of Windows 95's myriad multimedia resources.

Brooktree's chipset includes a three-chip core (the BtV2115 2D MediaStream Controller, BtV2488 Packetizing Data DAC, and BtV2300 AudioStream Interface), augmented with the new BtV2210 Analog/Digital Game Port and MIDI Controller and BtV2125 3D MediaStream Controller. A planned video capture chip will round out the set. The Brooktree chips can reside on a single add-in card, operating through a set of integrated software drivers and a single connection to the PCI bus. Brooktree claims a 30% reduction in demand on the CPU under Windows 95 compared with alternatives that don't support the new APIs directly.

The Game Port chip includes support for infrared-lined stereoscopic glasses for 3D effects that previously required a separate controller box, drastically reducing the cost of stereoscopic viewing. It can handle two simultaneous video windows of up to 1024x768 resolution with true-color fidelity. Other capabilities include wavetable synthesis, chromakeying, support for popular video codecs, dual stereo 16-bit audio channels with simultaneous MIDI output, and accommodations for both analog and digital joysticks.

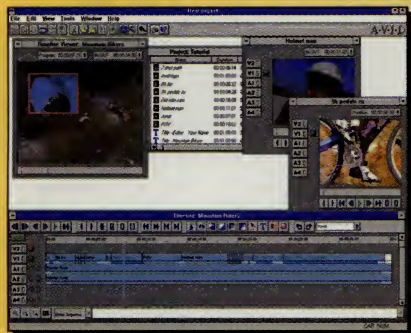
Early adopters of Brooktree's chipset include TeleVideo, who offer the AllMedia PCI board (less than \$300) with optional daughterboards, including one that sports a 28.8bps modem. Similarly, the 9FX Media574 (\$349) from Number Nine Visual Technology promises an all-in-one multimedia acceleration solution for Windows 95.

Nvidia's NV1 and SGS-Thomson's STG2000 boast similar attributes — more ambitious ones, in fact — within a single chip. Capabilities include 2D graphics acceleration to 10 Megapixels per second, 480 textured polygons per second for 3D, support for several standard video codecs, mixing of 50 channels of digital audio, wavetable synthesis, and a DirectInput port. "Video texturing" allows developers to texture a 3D object with full-motion video. Both PCI and VL bus interfaces are supported.

Brooktree, 9868 Scranton Rd., San Diego, CA 92121-3707; vox 619.452.7580; fax 619.452.1249; email apps@brooktree.com. Reader Service #104 • Nvidia, 1226 Tiras Way, Sunnyvale, CA 94086; vox 408.720.6100; fax 408.720.6111. Reader Service #105 • SGS-Thomson, 55 Old Bedford Rd., Lincoln, MA 01773; vox 800.835.3228, 617.259.0300; fax 617.259.4420. Reader Service #106 • TeleVideo, 2345 Harris Way, San Jose, CA 95131; vox 408.954.8333; fax 408.954.0623. Reader Service #107 • Number Nine Visual Technology, 18 Hartwell Ave., Lexington, MA 02173-3103; vox 800.438.6463, 617.674.0009; fax 617.674.2919. Reader Service #108



Pro Video for Windows



Avid, having conquered the market for professional digital video production tools, is after the desktop market with Real Impact 32-bit video editing software for Windows (\$2,995). Compatible with the TrueVision TARGA 2000 PCI-PC and TARGA 2000-E 20M (EISA) video boards, Real Impact plays back full-screen, full-motion video complete with audio, with no time required to compile multiple tracks. Image quality can be selected to balance system performance, available storage space, and distribution medium. A variety of video, audio, animation, and graphics file formats are supported. Avid, Metropolitan Technology Park, 1 Park W., Tewksbury, MA 01876; vox 508.640.6789; fax 508.640.1366; AOL Forum keyword Avid.

Reader Service #109

Workgroups 3.11, and Windows 95.

Motion Pixels, 7320 E. Butherus Dr., Ste. 100, Scottsdale, AZ 85260; vox 602.951.3288; fax 602.951.2683; email questions@motionpixels.com; http://www.motionpixels.com.

Reader Service #110

3D Crisis Management

As 3D becomes the new standard for computer graphics, there's a need for development tools that don't require a 3D specialist to use them. The bid from Crisis in Perspective is JOEY 4.0 (downloadable free of charge from http://www.autodesk.com), a Windows toolkit

for creating 3D applications "without any prior 3D graphics knowledge or experience." JOEY integrates with Microsoft Visual C++ and MFC 4.0 to enable 3D capabilities within these environments. It accommodates several 3D graphics and rendering systems including OpenGL and the new HEIDI 3D API from Autodesk.

An extensible version called the JOEY Development Environment (\$250) is also available. Runtime licensing fees are not charged for either product.

Crisis In Perspective, 1306 NW Hoyt St., Ste. 409, Portland, OR 97209; vox 503.227.7826; fax 503.223.4453.

Reader Service #111

PDQ RAID

American Megatrends (AMI) claims to have the fastest RAID controller in the world, the MegaRAID Ultra (expected price \$2,500 including 8MB cache). Data transfer speed is rated at 40MB per second for each of three FAST-20 SCSI channels. This rate is achieved by pairing an Intel i960 32-bit RISC processor running at 33MHz with a custom ASIC. MegaRAID Ultra supports a cache of up to 128MB via 72-pin SIMMs and operates at RAID levels 0, 1, 3, 5, 10, and 50. Graphical interface software is included for managing multiple disks and controlling RAID servers from any network node. General Alert security software also is provided. American Megatrends, 6145-F Northbelt Pkwy., Norcross, GA 30071; vox 800.828.9264, 770.263.8181; fax 770.246.8790; email stephenb@american.megatrends.com.

Reader Service #113

Multimedia Notebook

Packing Pentium performance into a notebook computer, Kiwi of southern California introduces OpenNote (\$2,495 with 540MB hard drive, double-speed CD-ROM drive, 8MB RAM; \$2,795 with 16 MB RAM). The unit, which employs a 100MHz Cyrix 5x86 processor, boasts multimedia capabilities, low power consumption, and easy upgrades — in fact, the microprocessor itself is a plug-in module rather than a soldered-in component. The video display can be upgraded from dual scan color to an active matrix color display.

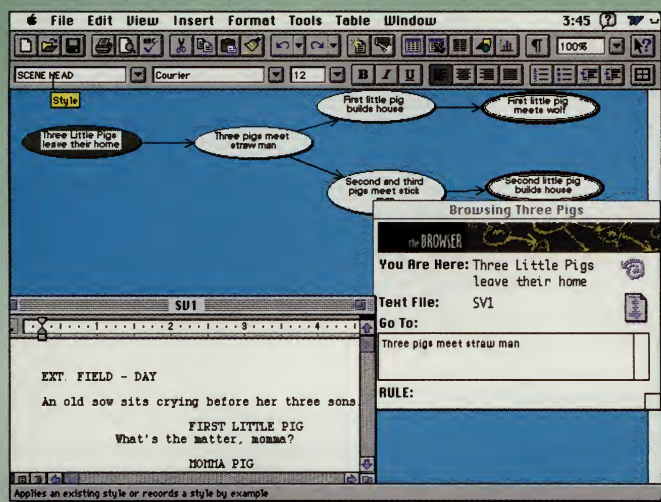
Kiwi, 2314 Walsh Ave., Santa Clara, CA 95051; vox 408.492.9188; fax 408.492.9187; email kiwinote@kiwicom.com.

Reader Service #114

Lively Presentations

For spiffing up presentations created in Microsoft PowerPoint for Windows, Gold Disk's Instant Multimedia (\$49) provides quick and easy

Authoring for Authors



StoryVision for the Mac or PC (\$199) is an outlining program specifically designed for interactive media. The program facilitates mapping branch structure and then attaching scene diagrams, text, and graphics to produce a detailed interactive design. StoryVision, 171 Pier Ave., Ste. 204, Santa Monica, CA 90405; vox 310.392.5090; fax 310.392.7550; email storyvisn@aol.com.

Reader Service #112

**SuperCard
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Metatec's NautilusCD



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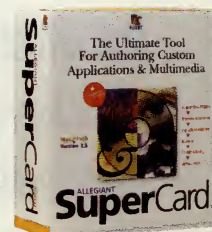
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READER SERVICE NO. 9

NEW GEAR

options. Upon loading an existing PowerPoint presentation, you're presented with 20 animation styles that animate the template, background objects in the template, text, and charts. Preview the current slide to make sure the style looks appropriate, and then customize by adding sound to specific slides, setting slide durations, and enabling or disabling chart animation. When you're finished, save as a self-running file, a PowerPoint file, or in Gold Disk's own Asound for Windows format.

Gold Disk, 2475 Augustine Dr., Santa Clara, CA 95052-3002; vox 800.982.9888, 408.982.0200; fax 408.982.0298.

Reader Service #115

MPEG Mania

FutureTel offers a suite of hardware and Windows software tools that address the gamut of MPEG video production from encoding to archiving. The first link in the chain is PrimeView II (\$15,000-\$17,000), a single-board YUV-in MPEG-1 encoder. It features horizontal and vertical filtering; advanced color correction functions, RGB pedestals, and control over gain and linearity; and black and white stretch for

adjusting white gain below 50%.

MPEGtools (\$2,000) is a software suite that includes the following applications: Video Clip MPEG-1, MPEG Analyzer, MPEG File Converters, and MPEG Album. Together, they provide frame-accurate editing, special effects, file conversion, and troubleshooting functions. MPEG-workshop (\$2,500) combines MPEGtools with MPEGworks for such functions as sessions setup, transport control, quality optimization, editing, and archiving. Finally, MPEGpublisher (\$3,500) is a complete MPEG authoring and distribution solution, comprising the PrimeView II board and MPEGworkshop plus CeQuadrant's WinOnCD and VideoPack for authoring and mastering.

FutureTel, 1092 E. Arques Ave., Sunnyvale, CA 94086; vox 408.522.1400; fax 408.522.1439; email cindyh@futuretel.com; http://www.ftelinc.com.

Reader Service #116

From the Desktop to the Web

Backdrop, Automedia's presentation authoring tool for Windows (\$49), integrates graphics, photos, audio, and World Wide Web addresses. Thus, end users can connect to

specific Web pages by pointing and clicking within your presentations.

Automedia, 705-2 E. Bidwell St., Ste. 282, Folsom, CA 95630; vox 916.631.6383; fax 916.631.0506.

Reader Service #117

PC as Game Platform

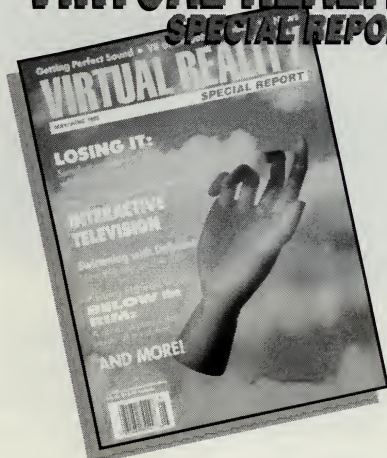
The latest effort on the part of Creative Technology to turn the PC into a state-of-the-art game platform takes the form of a hardware suite for Windows 95. The 3D Blaster gaming card (\$349), Sound Blaster AWE32 PnP sound card (\$249), and 28.8, v.34 DSVD (Digital Simultaneous Voice and Data, price not available) modem combine to create an extensible cutting-edge gaming environment. To ensure that titles are available, Creative has recruited a number of developers for its BlasterWare development initiative. The new titles will feature not only 3D graphics with 3D audio, but realtime multiuser play in online environments.

Creative Labs, 1901 McCarthy Blvd., Milpitas, CA 95035; vox 408.428.6600; fax 408.428.6611.

Reader Service #118



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PC Connection

READER SERVICE NO. 11



The Bill, & the hype, the sweaty developer

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WORLDWIDE AIRLINE TERRORISM

isn't the work of fanatical ideologues from dusty terrains.

It's just that flying coach sends some people over the edge.

It's sort of the same feeling you get when your editor gives

you a deadline for an article about something that irritates

you. I never cared much for the Rolling Stones (for God's

sake, act your age guys). I don't believe Windows 95 users

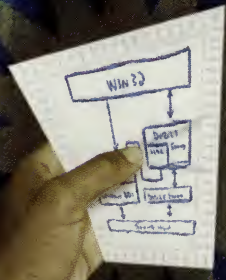
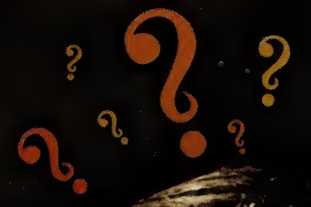
can safely inhabit the same commercial universe as Coke

drinkers. I really think it's ostentatious to be spending \$50

million on a mansion, even if you can afford to, unless

you are Hugh Hefner, and I am really annoyed at never

having bought Microsoft shares when they first came out.



The Bill, the hype, & the sweaty developer

Well, I was sitting in Cattle Class, flying down to Phoenix for a wedding, and right next to me was this gentleman wearing a Windows 95 T-shirt. I looked at him, thinking what possible sartorial madness could have resulted in such appalling dress sense. Not having any explosives at hand, I decided to confront the portly fellow sweating against my shoulder.

"Excuse me, sir? I hope you realize that Microsoft does not need your help in promoting the Macintosh interface on the PC. In fact, they have a number of eminent rock and roll chappies, admittedly long in the tooth, but possessed of great recuperative powers for their age, who are singing their praise all over the known face of the planet earth."

"Oh, I appreciate your candor and welcome the opportunity to help you better understand my personal beliefs." He noticed that my face was bright red and handed me his prized packet of peanuts, the only sustenance that could be hoped for on the arduous journey ahead. I felt a kinship with this man, a bond formed through mutual suffering rather than any shared beliefs.

He continued as I sucked slowly on a honey roasted delight, "For many people Windows 95 is not just a product, but it is a way of entering the new millennium filled with hope and a tidy desktop interface. However, for some of us it is even more than that. It is a gaming platform devoid of ruthless licensing rights, cutthroat business practices, and possessed of an enormous installed user base. I suppose it may have escaped your notice that His Gateship has emissaries who travel far and wide preaching the gospel, and taking back with them to their hallowed ground the hopes, wishes, and desires of all mankind. Ask yourself: 'Where do you want to go today?' my friend, and all shall be clear."

I felt humbled by this unwashed disciple and no longer felt that the odor surrounding him was to be feared. He obviously bore the senses of all developers who have been chained to ridiculously childish boxes that tout the strengths of the plumbing profession; he obviously bore the smell of incarceration amongst takeout pizza and memory allocation problems. Was I wrong? Was I wrong for thinking that Windows 95 was merely a well-hyped product promising so much to a world that had grown to expect so little? I took a sip of juice from my cracked plastic cup and asked my greasy companion to help me better understand what it was about Windows 95 that made it such a breakthrough for PC games and multimedia. Of course, I also felt slightly geeky for wanting to know so much, but I reckoned it

would save me having to do any research.

"I apologize to you for having so rudely dismissed your religious beliefs for I had no idea that The Bill had divine origins," I said. "Oh, don't apologize, it is well known to those who dwell in the Valley that he who maketh big on the IPO is anointed, and that he who maketh biggest is The Bill," smiled the slightly unshaven one as he proceeded to explain what I had neglected to believe. "It all began with the desire of the Great One to take over the hearts and minds of all peoples. He realized that if you want to own a person's soul you have to make them laugh. You see, all the technology in the world isn't going to make someone love you, but you entertain them and they'll do anything you want. In fact they'll just go out and buy more memory, more hard disk space, and more CPU and graphics power, just so they can feel good about having spent three thousand bucks on an ugly piece of plastic that only one person gets to use at any one time. Of course, if you hook them on your systems then you can get them hooked up on home networks and have ugly boxes for everybody. Before long you have people everywhere relying on everything that you produce. Man, The Bill will take care of all of us, he'll know who we talk to, where we are, and how much of a credit rating we have to spare. He'll be our father, all of our fathers, and he'll take care of us."

Well, now the guy looked just like the blob he was, but I couldn't help feeling sorry for him as he sobbed into his sickbag. "I'm sorry man, I can't tell you what it means to us guys to have someone who finally cares for our needs."

"Okay, bud, get on with it. What's Windows 95

got under the bonnet? I have a deadline."

"Excuse me?"

"Nothing, I'm sorry. Tell me about developing for Windows 95."

"It's all about the Windows Game SDK. I mean, they just went all out to get developers hooked. They offered them a Heaven on Earth and said DOS is out. Well, not quite out, but you don't need it, trust us. They gave us all a reason to convert. It's like a candy trail, but no one really knows what's at the end of the line. Kind of like faith, but backed up with really good retail sales in the first six months.

"Anyhow, I'm getting off track. The main thing is that the Game SDK has some really neat stuff." Mr. Hygiene wiped away the drool forming around his lips, took a sip of his Diet Coke, and went on. "They have it so that Windows 95 games should match, or improve on, DOS games, and they have a bunch of APIs to help you do that. These guys got together with the hardware people, the software people, and the really hardcore gaming guys, and stewed up something for everyone to eat.

"You could say it all got started with WinG. Here was a library designed to make games work better under Windows, and it was just fine on the 2D stuff, but not much else. I mean, you want to really shock every part of a system when you're making a game. We're kind of used to having the freedom to push the system to its limit, because with so few resources on the game boxes, we've had to do it in the past to get faster graphics and better effects. It was always with the PC that we had a system chock full of memory, with all these way

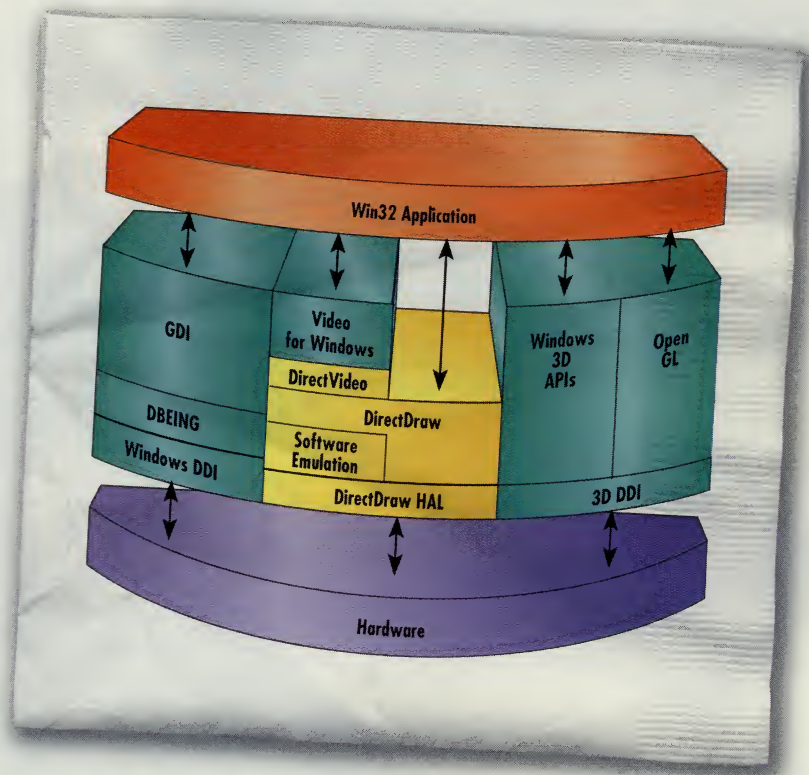


Figure 1. The API hierarchy.

cool graphics cards that move stuff around the screen whammo, and we had processing power to the eyeballs, but we couldn't use it. Man, you don't know what it feels like."

"You're not going to cry again?"

"No."

"Good."

"Well, WinG was kind of good. It got the show on the road, and it finally proved that what you could do on a cartridge-based system was possible on a PC, but DirectDraw is what's going to make it all happen on Windows 95. Look, let me

draw a diagram on this napkin to show what I mean." As he started to scribble away on his napkin, I noticed that his T-shirt was taking on a different hue.

For a moment my mind became preoccupied with the Great Plague, but I couldn't let my imag-

COMPARING COMPATIBILITY

If there has been one stumbling block in the way of the Windows 95 juggernaut it has been the issue of compatibility. Corporate America isn't going to be so quick to want to upgrade their systems considering the sheer logistical nightmare that entails, but this Christmas an awful lot of Windows 95 screens will be lighting up the tree. Although some commentators have been prone to whine about Microsoft testing their software through the user community, thereby charging for the privilege, the company has put together an enormous effort making sure that its product is as well tested as it could be. And a lot of people have been eager to work with the beta release of the software. So many companies, developers, and individuals have a vested interest in making sure that Windows 95 works smoothly that it sometimes seems to me absurd to think, or hope, that it will have problems. Sure it will, but does it mean meltdown? I would like to tempt providence, but I won't. This is serious business for MIS managers, and interactive software can just ride on the coattails of the business apps. Nevertheless, upgrading to Windows 95 can be a gloomy experience, as I found at one small firm I visited recently. For example, if you use Microsoft Office you better get it upgraded if you want to really work with a suite under Windows 95. You don't have to, but you should. If you're running 32-bit applications under Windows 3.1 and upgrade to Windows 95, you are going to have problems. If you need help, don't think you're alone.

Microsoft claims to have had 50,000 beta sites in addition to 70,000 Microsoft Level II developers. They have also sent out 400,000 preview kits to over a million users. Their own internal testing of Windows 95 has cost the company 293 man years. However, when it comes to gaming and multimedia communities, this comes as a bit of superfluous information. To quote one industry insider, "If it works on Windows 95, that's great. If it works on Windows 3.1, that's okay. If it doesn't work on Windows 3.1, who cares."

In other words, most people are going with Windows 95 as if it's a virgin platform, so compatibility has a different meaning. Of course, many existing users who upgrade to Windows 95 have DOS and Windows titles that they would like to run on their new operating system. There's not going to be much of an improvement over what they had previously unless they buy Windows 95 native titles, and the likelihood of serious compatibility issues is rare. Let's face it, it was bad enough trying to get some CD-ROMs and DOS games to run properly originally, so no one should expect a smooth transition to Windows 95. A couple of things to bear in mind, as an example of the sort of niggly things that can send your support staff to the nearest cliff edge:

KEY DISK PROTECTION. If you were using this sort of encryption to protect your software in the past, test it on Windows 95.

DYNAMIC RESOLUTION CHANGES. Windows 95 does this differently than previous versions.

INT 13 AND 26. Saving games to the local disk using these two interrupts is a no-no in Windows 95.

However, nothing beats simply testing your stuff on Windows 95. It's surprising how few developers have been in a position to or are willing to do this. Perhaps

the world will become one where there are those who have Windows 95, and those who don't. It seems the computing community is saying that — at least as far as games and multimedia software are concerned — Windows 95 is the best shot anyone has of fulfilling consumers' expectations of interactive software.


It may also have a lot to do with the wooing and courting of the games community by Microsoft evangelists. Toward the end of August, Microsoft hosted the Meltdown in Tukwila, Washington. The objective of the event was to test game software and hardware systems that would be ready for Christmas '95. It was an invitation-only event, and about 31 hardware vendors and 10 software companies attended. It was final regression testing, and Microsoft used the event to make modifications to the Game SDK. It was a pretty important turnout, and on Oct. 30 — about 10 days after this issue goes to press — the follow up event, Judgment Day, promises to be one big rollout party for the press. Yup, all of us are hoping to go for the Doom DeathMatch 95 at midnight. We have no real lives to speak of and Microsoft is planning to hand out a CD sampler with about 15 Windows 95 games titles. It's pretty good stuff — especially when you see DirectDraw and DirectSound doing their thing at high resolution, hi-color, and with hardware acceleration through a graphics card.

COMPATIBILITY TESTING

Don't be disheartened if you haven't got a zombie churning off some glorified SuperVGA card. There are other ways to win respect, love, admiration, and shelf space. One sure way of getting notice for your products on the shelf is to join the Microsoft Windows 95 Logo Program. Whereas in the past the Windows logo on a software box denoted compatibility, the Windows 95 logo is a sign of specific development for the Windows 95 platform. For software Microsoft uses an independent testing house, Veritest. For \$600 they will do validation for software in which English is the primary language. It's \$800 for non-English language products (as opposed to localized products). Already tested products that are localized for other languages do not have to go through the testing procedure. If a product doesn't pass the test, there is a \$200 re-testing fee. It's a small price to pay for good marketing. It also sends a nice message to your potential customers.

Windows 95 logo'd products must be 32-bit Windows-based applications, and provide better multitasking and application robustness. They also have to follow the guidelines for the enhanced user interface of Windows 95, test on Windows NT (a bit of a problem for games using the Microsoft Game SDK), and provide support for long filenames, automated install, and uninstall capability. A logo'd box is ideal for multimedia CD-ROMs, but it may prove unnecessary for the hardcore games market.

For more information on the Windows 95 Logo Program and compatibility testing at Microsoft, contact: Microsoft, Attn: Windows Logo Program, Bldg. 20, One Microsoft Way, Redmond, WA 98052-6399; fax 206.936.7329, Attn: Windows Logo Program, Bldg. 20; email winlogo@microsoft.com.

You can get more detailed information by dialing up Microsoft's developer faxback system on 206.635.2222. Microsoft also has forums and connections through Prodigy, CompuServe, and America Online, as well as their Web site at <http://www.windows.microsoft.com>. 

The Bill, the hype, & the sweaty developer

ination run away with me. We were on to something big.

"Those gamesmeisters at HQ have made it so that everyone can have access to the hardware, and it all starts with something called HAL (Hardware Abstraction Level). HAL is implemented by the hardware guys, and it tells DirectDraw what the hardware can do. So gamers can make their games take advantage of whatever functionality is available on the system. If it ain't there, it's not reported by HAL. DirectDraw is implemented by the DDRAW DLL. It's a 32-bit DLL that implements all of the common functionality required by DirectDraw and it's device independent. So, you get direct manipulation of video display memory, hardware bltters, hardware overlays, and page flipping, and you remain compatible with everyone else in the Windows 95 universe. It's like they've given gamers their own door into Windows 95. Maybe it's just a way out to DOS performance, but at least it's more than we had before. We get double-buffered and page flipping graphics, access to and control of the video card's blter, support for 3D Z buffers, hardware-assisted overlays with Z ordering, access

to image-stretching hardware, and simultaneous access to standard and enhanced display device memory areas." What a breathful, even for this frog mouthed guy. I waited while he puffed himself out of the coronary zone.

I looked over the napkin he had handed me and I could see that DirectDraw is not a high-level graphics API. This thing is built for speed and functionality. Then there's the DirectVideo component; video codecs have access to display device dependent features. Those people at the graphics chip companies must be sacrificing their VGA programmers at the altar of The Bill right now. They don't just have to produce faster and faster Windows drivers anymore — that was getting to be a true yawn exercise. In fact, at one point it seemed that you could get rid of graphics cards for good and just have a graphics chip upgrade socket on the system motherboard. Well, now you can sell the general public all kinds of goodies like video acceleration, high-resolution gaming performance, and stuff you just can't get on your little games boxes attached to the back of the TV.

You can sell more cool add-on stuff for all those slots in the back of the computer and make like they're indispensable. Way Cool! The Bill isn't just selling a piece of Heaven, he's giving them market share, upgrade sales, and a piece of the pie. Why else would every major publisher be banking on the PC market? Everyone out there can sniff blood, and no one wants to be left out. Sure, they tell you how much of an improvement Windows 95 is on what has gone before, but when it comes to gam-

ing you're still talking DOS performance at best in most cases.

My rotund narrator bolted me out of my skeptical reverie. "Hey, man, I've been to the Microsoft Negative Thought Patterns Symposium. You're wrong, man. With Windows 95 gaming you have plug and play, better memory management, and none of that crap about changing config.sys files every time you want to boot up the latest hot shooter. Take a look at what else they have on the Game SDK — AutoPlay."

So, they can read minds. What other insidious traps lay for mankind? Was there nothing that The Bill couldn't do?

"Hey, man, I'm warning you! No more negative energy. Look at what the Great One has done for consumers with AutoPlay: installation and configuration under Windows 95 is virtually as simple as jamming a cartridge in a home video game machine. AutoPlay knows when you jam in a CD and immediately launches whatever application is named in the autorun.inf file on that disk. The Bill is taking care of the electronically challenged, man. AutoPlay-enabled CD-ROM products run themselves.

"It's beautiful. It's just beautiful. Those guys at the fruit company were so smug, but we all know what the serpent gave Eve in the Garden of Eden. All along The Bill has said that the plagiarist will inherit the earth. It's just good business. And now we can launch any application document directly from a CD. You can even open up little teaser applications that execute quickly and let the techno dudes get into their multimedia apps at a quicker pace. Pop your CD in and run with it. It's a beautiful thing."

It all seemed so ironic how the Macintosh Maniacs had lost the Super Bowl of interfaces to the Redmond Ravens. The Macs had a better play-book, a great looking uniform, and nicer cheerleaders, but they just couldn't throw the ball. I picked up the AirPhone and made a call to my broker, Longshot Luigi. "Sell the fruity computer stock . . . No, don't buy into your cousin Enzo's demolition business! You bought a copy at midnight? You don't have a computer, Luigi . . . I know, the ads are really cool . . . Gotta go, Luigi."

I turned to the perspiration pod next to me, "So, what else is there to drool over?"

"DirectPlay. All this other stuff is for the now, but DirectPlay is the future of gaming."

"Why?" I asked using my best interrogative, journalistic tone.

"DirectPlay is a connectivity API made to measure for gaming. You have a DirectPlay server installed on the user's system, and it can be provided by anyone, including online service providers."

"Bill's master. . ."

"The Bill!"

"The Bill's master plan to hook everyone into eating his pie." See, I do occasionally understand stuff about computers.

The Washington Cherub continued, "Well,

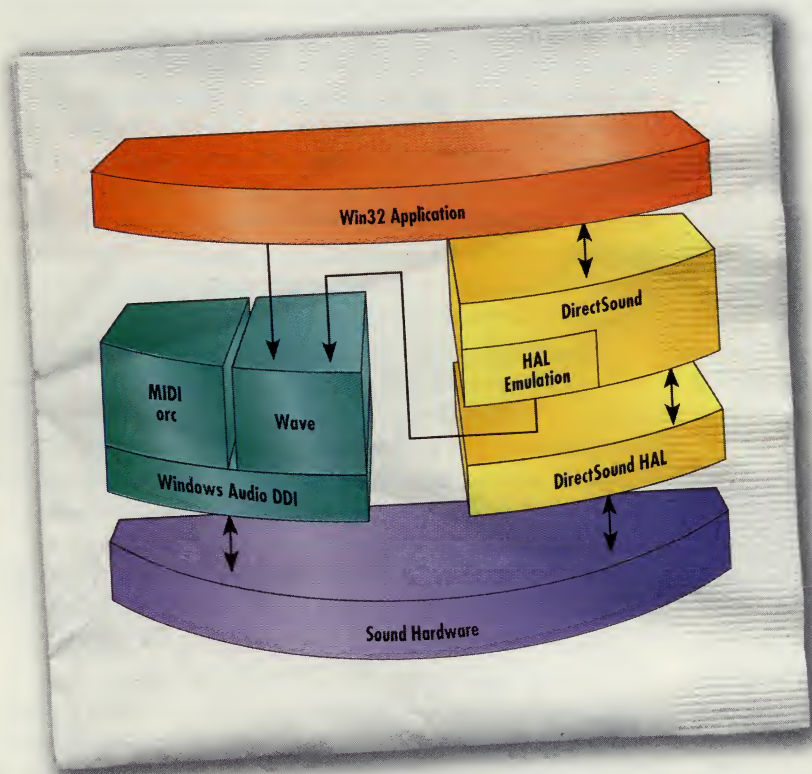


Figure 2. DirectSound Hardware Abstraction Level.

yeah. A game using DirectPlay doesn't worry about whether it's using a modem, network, or online service. A game just asks the DirectPlay object about its latency and its bandwidth, as well as about previous and existing game play sessions. Each game has a Global Unique Identifier (GUID, sometimes called UUID) that exclusively identifies it. A GUID can be used with any system that has a network card and comes with the Win32 SDK. So, you get an ID for every game across the network — whatever the network may be physically is irrelevant — and each player is assigned a server that can communicate with the other servers. Instead of handshaking network protocols, you get earthshattering rifle shot comms.

"This is the language of desktop warriors. I mean, the guys at HQ are working it out so that all message information sent across the system is game information. It's as easy as making a phone call. No network card problems, no comms problems, just you and some other guy who could be halfway across the world. This can eliminate war."

I had to interject, "You mean The Bill wants to spread world peace?"

"Haven't you been listening to what I've been saying all along? The problem with people-to-people stuff is that if you put one bunch of guys in the same room as another bunch of guys, you're gonna get a fight at some point. It's like that ten thousand monkeys and a typewriter thing, I think. But anyway, my point is that The Bill is going to make it so that we never have to be that close to anyone anymore. Heck, think of all the good stuff that'll do for the family unit."

My travel companion's eyes began to well with moisture again. I changed the subject quickly. "Okay, all this stuff sounds pretty good if it works like they say it's going to, and there are a lot of people betting that The Bill will deliver, but it's all visual stuff. What about the aural doodahs?" I love it when I get technical.

"You mean the sound subsystem. Same principle as everything else: compatibility and speed. You got another cocktail napkin?"

His ability to draw straight lines with those pudgy, perspiring hands of his was most impressive.

"Okay, you see how you've got another HAL here. Same thing as in DirectDraw. The hardware tells the HAL what it's got cooking: buffers, acceleration, and all that really good audio stuff. The software can use it if it's there, but the great thing about DirectSound is that it allows you to mix audio streams with less latency and at high speeds. You've got this fast-moving graphics action and if the sound effects, music, and noise aren't in sync, you lose the whole feel of the game. You want to have the background music playing, and you want all that sound of splattering anatomy coming across crystal clear. Having the HAL interface means you can also extend the functionality and performance of your sound system to take advantage of the hardware in your system."

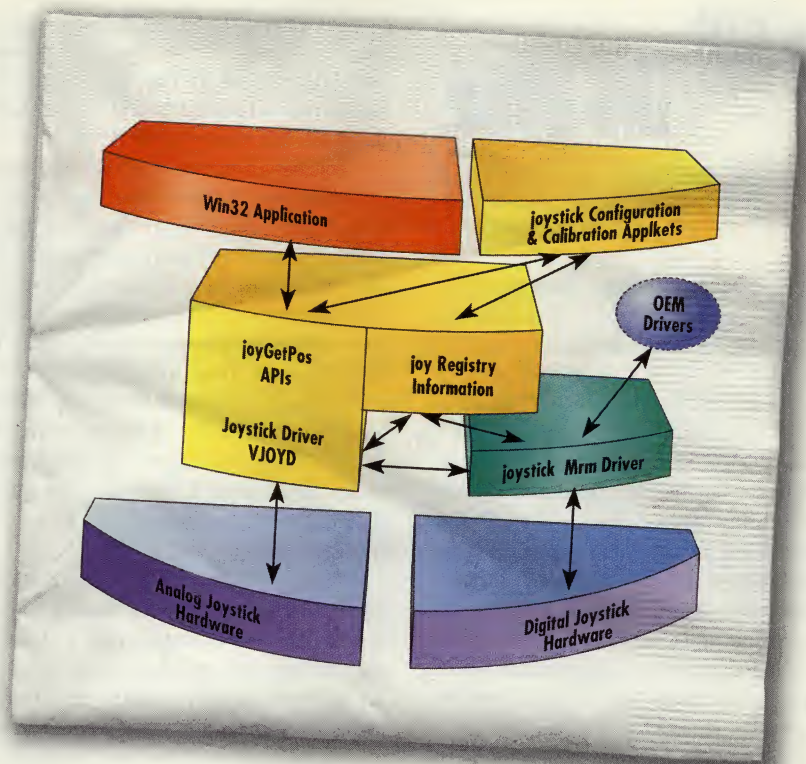


Figure 3. The DirectInput interface.

The soundcard makers were getting tired of sticking pins into their Sound Blaster dolls. The Bill breaks up one monopoly after another as he gets to make up his own. Divide and conquer. I don't know whether it was the peanuts kicking in or just the altitude, but I was beginning to see things from The Bill's point of view. No guy with his own underwater sound system at home could be all bad. I let his disciple continue.

"And after sound comes the big one: input devices."

"You mean joysticks, VR helmets, meeses, and all that pointing stuff."

"Right, but the PC has never been the best machine for input devices. You never had the same feel as you get in an arcade or with the dedicated game boxes. You want twitch reactions when it comes to input, and the guys at HQ got that fixed too. DirectInput."

I had to ask. "You ever wonder why computer people always put capitals in the middle of words?"

"I notice certain magazines do it too," he replied. "It's a phallic thing. Normally marketing people get to do pretty stuff like work with Cindy Crawford or have a luxury sedan drive through a Tibetan monastery. They kind of do macramé for the senses and pass it off as style. Well, technology is full of spit and sawdust manspeak. It's all about Input, Connection, and World Wide stuff. So, to compensate, the marketing guys have to come up with techno babble that shows how tough they can be. I mean, it takes a pretty tough keyboard jockey to be able to get all those letters in, but to then have to hit the Shift key a couple

of times in between — it's tough, like learning German."

"It's over-compensation by the different sides of the brain, but you were saying?"

"DirectInput really needs another cocktail napkin." He reached out for a passing flight attendant who rather grudgingly offered him a handful of napkins.

"Anyone who has ever had to use a joystick on a PC knows it's a bear to get one configured for a game, and in DOS you always had to get the thing recalibrated whenever you switched applications. It isn't the same under Windows 95. You have a DirectInput driver and your joystick should work with any Windows 95 game. Then you've got the digital interface, which doesn't have the same CPU overhead as an analog joystick. You get to hang a lot more devices and features on a digital interface, too."

One more sip of the Coke. He rocked back in his seat, mesmerized by some imaginary vision in the cockpit, and continued, "Then there's the way DirectInput lets you communicate with the joystick. You can have a game that actually moves your device for you. You're in a fighter plane, you get shot, you lose control, and your system begins to shake as you go slamming into the ground. You could have your bed connected to your computer and control everything — have everything respond to you — just by rolling around."

"Is that a The Bill thing, or are you winging it?"

"It's kind of my vision."

"Thought so." Next time I drive to Phoenix. "This stuff sounds like Microsoft is just catching

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up with the Nintendo crowd. Sounds pretty dumb to play games on a machine that only does what can be done on something for a tenth of the price."

"I was saving the best for last: 3D," he almost spat it out across the aisle.

"The PC is going to be kicking the butt of everything else out there on 3D. The Bill said, 'Go forth and bring me back realworld stuff,' and these guys went and got it all: 3D games libraries like the Rendermorphics RL, OpenGL, 3D DDI. No stone left unturned."

I had to interrupt once more to prove a point to the readership of this magazine (that I don't just make this stuff up). "Isn't 3D just a promise of what's to come? Isn't it just another excuse to get the user to fund companies' development

departments by investing in lousy high-tech games, expensive add-on boards, and whatever Intel MHz squeeze they can get?" I took a deep breath, relieved that my critical faculties had not deserted me at the most crucial hour.

"Well, first of all, let's clear up some misconceptions about 3D under Windows 95. It's part of the bigger picture and not something that's going to be easy for a lot of people to work with off the bat. Rendermorphics was a small fry swimming quite happily with a couple of other little fishies flashing 3D APIs for the gaming community. Then The Bill bought them, and the Windows 3D API is being built around their technology. Whatever it turns out to be it'll work through DirectDraw and 3D DDI. So will OpenGL, but that's way too heavy for what we want to do. Like carrying weights in the marathon."

"Good analogy."

"Thank you. You see what I'm getting at? We've got a layer of software that can hook into any 3D acceleration or hardware features that are out there. We never had that before, and on top of that we've got DirectDraw controlling palettes, textures, buffers, and Z buffers keeping us away from all the Windows GDI stuff, and

screen management."

"So, it might just make sense to fork out 10 times more for a Pentium machine to keep you entertained rather than settle for a slick PlayStation?"

"You know something? You are a blasphemer. Just a lousy blasphemer. They've sold over four million copies of Windows 95 in its first month of release. The Game SDK is out there for everyone, and some of the exalted few have been doing all kinds of wild and wonderful stuff with the gang in Redmond. By the time Windows 96 hits the streets next summer you're going to see the kind of gaming experience on the PC that you only get in a Spielberg movie, and this Christmas is going to see the first big, I mean BIG, wave of games for Windows 95. It's not about 3D, and it's not about better development tools, and it's not about technology breakthroughs. The Bill knows what it's about." He suddenly went silent.

"What's it about?"

"It's about entertainment. You can't sell people on productivity in their homes. You can't even sell them on education, and not at the prices that the Valley guys charge for their silicon. You've got to make them laugh. You've got to sell them television with a keyboard. The Bill knows this,

JUST AROUND THE CORNER. HONEST.

The Game SDK must address two major technology issues over the coming year, and do it well, if we are to really see innovation that makes the PC more than capable of holding its own with the new generation of 32-bit game consoles.

First is digital video and in particular, MPEG. This is an area where nothing that the console guys can throw at the consumer over the coming year can match what the PC is capable of doing. MPEG playback has proven too expensive to really capture the imaginations of developer and user alike. There's also the simple fact that VHS does video cheaper and much better than a PC, and you can fit a lot more people in front of a TV screen than a computer screen. However, the new generation of Pentium PCs, coupled with some amazing software codecs, is making it possible to get full-motion digital video on a computer recognized as a feature, rather than an extra or an option. Everyone hates postage-stamp video windows, jerky movement, and those horrendous, blocky pixelated actors. Okay, that last one isn't an MPEG problem, but everyone hates them anyhow.

At the recent first MPEG Developers Conference in San Francisco, about 300 people sat through presentations by Compaq, Microsoft, S3, Sigma Designs, Diamond Multimedia, and 17 other vendors. The talk was mostly about the need for MPEG titles. Maurice Voce of Compaq claimed there would be approximately three million MPEG-ready computers sold by the end of 1995, and that 80% of all consumer PCs will be sold with some sort of MPEG capability. Compaq's own consumer research foresees MPEG as a real differentiator for the PC. I tend to think of it as the *Myst* factor, "Look ma! They've got them movies running on the computer. Golly gee."

Well, Microsoft is enthusiastic about MPEG too, and not because AVI is a piece of !#\$%&!. They feel the time is right and it fits into their vision of addressing technologies that produce compelling depictions of the real world. So, you get MPEG, 3D (more on that down the line), and really cool images flowing across your screen. No console is going to match that. In fact, Microsoft's aim is to have

the DirectX technologies, 2D, 3D, and video all converge in the Game SDK.

At present, Microsoft has not said when they plan to deliver software MPEG decoding as part of Windows 95. They do, however, expect MPEG titles by Christmas 1996, which could mean beta testing coming up shortly. Microsoft published its MCI MPEG standard in September 1994, and they have endorsed the OM-1 Open MPEG specification, which they will update with a late beta of their software MPEG player. The Microsoft MPEG software decoder has been licensed from a company called Mediamatics and will be fully 32-bit compatible with DirectDraw and tuned for the Pentium.

Obviously, a lot of graphics boards are out there, with still more coming every month that have some sort of MPEG hardware feature, so the future looks good for consumers. It could be a boon for interactive multimedia. It will be interesting to see how it all translates in terms of sales. So far, the market for MPEG titles has been limited to OEM sales as manufacturers have bundled software with their hardware. You don't see MPEG shelves at the stores or outraged enthusiasts bemoaning the lack of MPEG.

The other thing that is really going to make a difference in the Game SDK is the arrival of the 3D API. Jon Peddie Associates, a consulting firm in Tiburon, California, that specializes in the PC graphics market, has produced a great report on the 3D marketplace. Peddie believes that the transition from DOS to Windows 95 will take over a year. "Until there is a Windows 95 DirectDraw game SDK with 3D, no new high-performance 3D games will be developed for Windows 95. Therefore, game developers will continue to develop for DOS and a few specific hardware solutions (such as Creative Labs 3D Blaster and Nvidia)," says Peddie. You can acquire a copy of the *3D Market Report* from Jon Peddie Associates by calling 415.435.1775, or by sending email to 71250.2146@compuserve.com.

So, the quality of games during the first year of Windows 95 is going to be more important than the quantity, which is fine because the PC isn't a 3DO machine (my attempt at snide humor). All eyes are on Christmas 1996, when

and he knows that it's all about software. So what if the heathens in Southern California don't want to let him get too close. The Bill is going to just make his own movie business and it won't be the kind you watch while eating buttered popcorn. It's gonna be in your face, in your living room, in your den, in your bedroom, and in your work. It's gonna be interactive, and people like me are going to make it run and come up with the ideas because we can't afford not to. This isn't a platform; this is *the* platform, and The Bill has made his message very clear for all who dare to believe. He's saying, 'You can't go against me, and you can't ignore me, so just go with it.' Build it and they will come." I could see the effort of revelation was exhausting him and asked the flight attendant to hand him a pillow and blanket.

"Thanks, man."

Epilogue

As I sat in my hotel room that night, after the wedding, typing out the story of a developer hoping to convert from Geek to Respected Pillar of Society, I couldn't help thinking about all the other developers out there struggling to create something extraordinary from a string of 1s and 0s.

The temptation is always there to pursue the next great technological marvel, but for the majority of developers it's about having enough money to keep working on what they love most.

Windows 95 is backed by the biggest marketing machine in technology today, and Microsoft has done a heck of a job with the Game SDK. The growth of home PC is growing on the back of the hype, and that means more systems out there that need software. Microsoft isn't hampered by the same licensing rules that plague the cartridge and settop box games market — and no interactive developer is ever going to admit that any development system is perfect — so it's a foolish soul who bets against Windows 95 being a great platform for gaming.

It isn't as spectacular as some would have you believe. Microsoft has done only what should be expected from them in developing the Game SDK, and Windows never was a technological breakthrough. By extension, neither is Win95. By the time you read this Windows 95 should be working and keeping consumers happy. What more can you ask you for?

Well, you can hope that the Game SDK is in full release by the time you read this, because

right now it's in beta. You can hope that Microsoft delivers the 3D API in early 1996. Otherwise there are going to be some very disappointed developers out there come Christmas time. You can hope that the whole thing works the way it should. Fortunately, there weren't too many games running on the previous incarnation of Windows for there to be any high expectations, and what there was can only leave room for improvement. As one producer told me on condition that I not mention his name, "If a Windows game works on 3.1, that's fine. If not, who cares? As long as the Win95 stuff is taking advantage of all the new features, we're going to be as happy as we can be."

ABOUT THE AUTHOR

Omid Rahmat was recently fined for flushing a large object on his recent flight to Phoenix. He remains unrepentant and thinks the particular employee/owner of a well-known airline had it coming. He is also developing titles for Siren New Media using the Win95 Game SDK.

it is expected that the best examples of 3D technology are going to hit the stores. While there may be a laissez faire attitude toward MPEG, there is no doubt that if it ain't 3D, it ain't hip in the games world. Here's where the real competition for Microsoft lies. With PlayStation and Saturn making 3D games standard fare for players, the PC has to prove its true potential with higher resolutions, more colors, and more complex environments, or suffer the ignominy of being an expensive PlayStation wannabe.

Judgment Day, the Halloween '95 rollout of the Game SDK, is probably going to be the start of a major 3D campaign from Microsoft. The first step will be Reality Lab beta 1. In late November we'll see the first cut of Direct3D DDK, and all things being well, we expect to see a full release of Reality Lab by the end of the first quarter of 1996. Just in time for Christmas. Although there are alternatives to Reality Lab [see the story on 3D APIs in *InterActivity*, July/August '95], Microsoft is supporting it across their whole family of operating systems. Expect to see an enhanced Reality Lab product line that would make it a more general-purpose, realtime 3D API.

The good news is that despite Microsoft's purchase of Rendermorphics, Reality Lab's engineering and development have stayed in the UK. We expect the API to remain object-oriented in structure and retain a cross-platform approach. At present that includes support for Macintosh, Power Macintosh, Unix, PlayStation, Sega, and other games systems.

Therefore, the lack of a Direct3D or for that matter a DirectVideo API in the first release of the Game SDK is not an issue for concern. Christmas '95 is only going to be a taste test of what should come next year. The present release of DirectX and the Windows 95 Game SDK Version 4.02 features DirectDraw, DirectSound, DirectInput, and DirectPlay. It's being shipped to 100,000 Microsoft Developer Network Level II members as a premium. Considering that the cost of joining the developer network is approximately \$495 per year, and that most of what you need in terms of development tools is sitting on your desktop PC — and you don't have to negotiate hefty licensing fees with Nintendo or Sega

— you might think now is the time to make a platform move.

Sega, who knows a thing or two about games, are looking to port their titles to the PC, and they have chosen to do so by supporting the Nvidia controllers. A number of other companies are looking to do the same thing. For their part, Nvidia would only have to penetrate a fraction of the overall PC market to be able to give developers an installed base comparable to, if not greater than, that of the 32-bit consoles.

It's a great time in the interactive world. It's unfortunate that so much of it is being driven by the gaming community, but the technology is available to all, and we expect to see some pretty amazing new interfaces and products over the coming year. We really think that the Game SDK in its complete form, with Direct3D and DirectVideo, should start to change the way we all work in interactive design.

The Open MPEG Consortium is a good place to be if you are really serious about MPEG. If nothing else it's a great place to meet the people who are helping to define MPEG. For more information, try their Web site at <http://www.om-1.org>. Membership can cost at least \$500 if you are a small developer.

The GamePC Consortium is another great forum and the meetings are well attended and lively. Contact Ken Nicholson at 75300.2772@compuserve.com. He's in charge of interactive multimedia at ATI Technologies and a founder of this group.

There's also the Games Developers Association in Palo Alto, California. This has more than 2,000 members. The number is 415.513.7219.

It may seem that these organizations are heavily biased toward games — okay, they are — but the information they provide is priceless for all interactive designers.

For information on joining the Microsoft Developer Network, call 800.759.5475 or 303.684.0914. For online info, <http://www.windows.microsoft.com>.

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3D MODELS AND texture LIBRARIES

There are practical limits to how many vertices people can model before going bananas.

Just where the polygonal limit is is the subject of intense debate among professionals. For some, the threshold is obscenely high. They think nothing of building million-polygon worlds, hand-painting custom texture maps for every object, and going home after a 14-hour day, calling in to their rendering farm

BY LEA ANNE BANTSARI

at two or three in the morning just to

make sure it's working, and returning the next day to do it all over again. For others, the tolerance level is decidedly lower. 📦 No matter where you fall in the polygon tolerance scale, prebuilt model and

texture libraries can help you populate a 3D world with all manner of geometry from human figures to exotic automobiles, dinosaurs, buildings, scientific instruments, ad infinitum. Using such third-party content

may seem like cheating to some, but for cutting development time and reducing costs, there's nothing like a little third-party instant gratification.

In this installment of our third-party content stock media series, we'll look at the issues involved in finding the right model, licensing it, putting a prebuilt or customized texture on it, animating it, and so on.

3D Models

Plants, animals, people and parts of people, maps, cars, planes, military vehicles, weapons, furniture — you can get 3D models of them in a variety of resolutions and all manner of styles. Don't see what you're looking for? Ask. Many sources of prebuilt models also do custom modeling, and they may charge much less for custom work if they can add the model to their library instead of selling it to you for exclusive use. See something that's close but not quite what you're after? Take a closer look. With a little work, you may be able to manipulate that model into the object you want.

Several sources license 3D models individually or in collections (see list on page 38). Almost every 3D modeling and animation package includes a few models and textures, and some bundle entire libraries with the application. Several — Alias/Wavefront, Asymetrix, auto.des.sys, Autodesk, Caligari, Corel, Crystal Graphics, ElectroGig, Macromedia, Ray Dream, Strata, and Visual Software to name a few — include models and textures or also sell separate collections of them.

Some BBSs are dedicated to the needs of 3D modelers and animators and offer models through their sites. In these days of the Information Superhighway, don't forget the World Wide Web. Many companies selling 3D models have Web sites where you can view their catalog, make selections, and download objects. By visiting the Web sites, you can keep current on a company's latest offerings. Avalon, a long-time source of public domain models and textures, is now on the Web via a site hosted by Viewpoint DataLabs. A few Web sites provide information on many aspects of things 3D. CompuServe's ANVENA forum is also a source of information.

In addition to Web sites, most companies utilize printed catalogs, and many offer their collections on CD-ROM. The catalogs give you something on your desk to thumb through and see what the model looks like in high-resolution print, while CD-ROMs provide ready access. Some Web sites and CD-ROMs also offer keyword searching capabilities.

For those 3D models not bundled with other software, most are licensed in collections, although some are available individually. Viewpoint DataLabs has traditionally licensed by the model, but they've also put together a collection of B-spline models (called Z-Art) that they'll bundle with 3D modeling software or sell di-

rectly. With a few exceptions, Acuris sells models in collections. 3Name3D also sells models in collections, but with the launch of their Web site users will be able to choose only the models they want — with price breaks for quantity.

Most collections are royalty free, but be sure to check the fine print. If you're going to use the models in media in which someone would have access to the models' geometry — such as VR simulations, walkthroughs, or Web sites — you'll have to negotiate an agreement to use the model. As is standard with almost all royalty free collections, ownership of the model remains with the company or the original artist, and most companies will not let you distribute the models (or modified forms of them) as part of another model collection.

If you can't find what you're looking for, some companies will work with you to develop what you need. With 3Name3D, it's like custom work, only different. "It's one of those things that walks the line," explains Steve Wallock, creative director for 3Name3D. "It's still developed along the same lines as the Cyberprop (3Name3D's name for objects in their library) — the low-to medium-res object that's used in the background — but it's custom in the sense that we work directly with the title developer to create these objects that they need and that may not yet be a part of our library. And then they become a part of our ongoing library." The licensing deal is based on the parameters of the client's project — lead time for development, number of props, etc.

Viewpoint DataLabs will license their library on a per-project basis, an option that's been popular with game developers. You pay a flat fee, and then you have access to the entire catalog for the duration of your development cycle. "It's not tied to the life of the CD," Viewpoint's

Evan Ricks, vice president of production and technology and creative director, clarifies. "We don't get a piece of the action off each CD sold."

Viewpoint is also looking into a pricing structure based on how the model is to be used, much like the stock footage or stock photo industries. Nonprofit users would pay less than someone using the 3D model in a nationally broadcast television commercial.

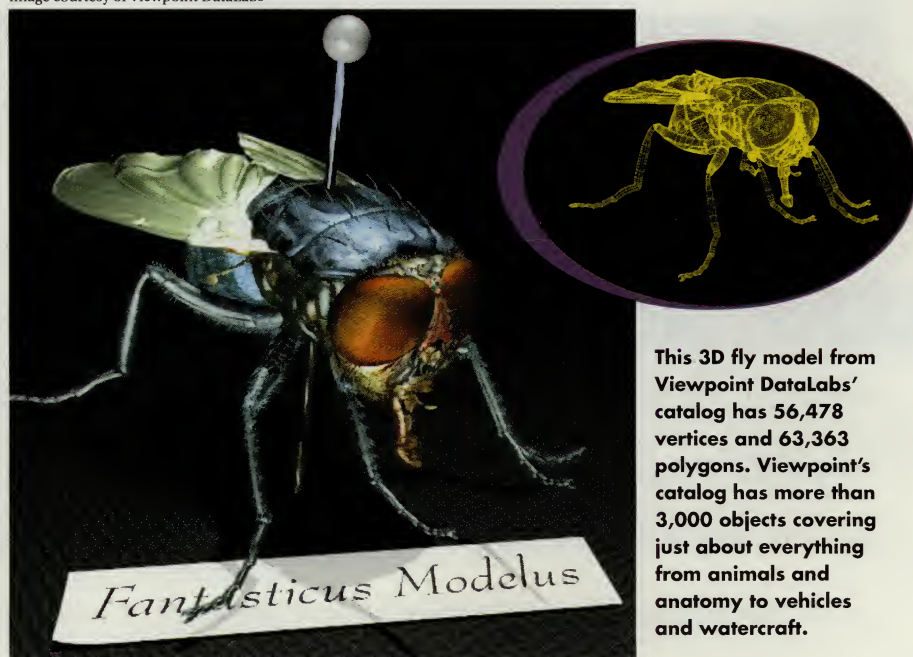
Modifying Models

Many people turn to prebuilt models when they need organic forms — especially humans — that are difficult to model. Prebuilt 3D models are popular as props to decorate, add detail to, or fill out a scene. In those cases, you can get lots of models for relatively few dollars and save your custom modeling budget (or time if you're doing it yourself) for the items and characters in the foreground of your scenes. Prebuilt models also save you the time and expense of researching what an object should look like.

When going the prebuilt route, many models may perfectly suit your needs, but others may require some tweaking to fit your application. The key is getting models that lend themselves to manipulation. Take Crestline's mannequin-like human model for example: "Many times special effects artists will use my basic structure as something to build on rather than actually using the final models for their rendering. They'll use my joints or the basic body structure and build around it," Tim Wilson, Crestline's principal, explains. Manipulation has some limits, however. "Since the models are hierarchical, artists need to be careful about how they alter the objects because the overlap at the joints could get ruined if they do something that's too extreme."

Take a standard prop and turn it into some-

Image courtesy of Viewpoint DataLabs



This 3D fly model from Viewpoint DataLabs' catalog has 56,478 vertices and 63,363 polygons. Viewpoint's catalog has more than 3,000 objects covering just about everything from animals and anatomy to vehicles and watercraft.

thing original: "You can easily take the arms of a chair and scale them up and then distort them in a certain manner," Wallock says of 3Name3D's Cyberprops. "Maybe distort the legs a little bit, stuff like that. Add a little detail . . . it's easy to do."

Look for models in which polygons are logically grouped. "If there's too many groups, they can always add them together," Wallock says. "But to have to separate the glass out from the hands of the clock or the trim, that's no fun."

Of course, the modeling package you use also makes a difference in how easy it is to manipulate models. Some packages make it easier to grab vertices than others. If you plan to modify a model, you'll need a program that will allow easy manipulation of individual vertices and groups of vertices. For example, some software, such as Autodesk 3D Studio, is polygon-based, while others, such as Macromedia Macromodel and Alias, are spline-based. Still others, such as Strata StudioPro, will modify both polygon and spline vertices.

Manipulating polygonal models may be a bit more complicated in a spline-based program. Other considerations are ray tracing or animation capabilities. Some modeling packages don't include them.

Counting Polygons

If you're on a tight geometry budget, consider using objects with lower polygon counts for background items that don't need as much detail. Either look for models with fewer polygons or models constructed so that you can easily remove layers of detail. For example, on a china cabinet you could remove the feet or the trim or the shelves. "That china cabinet could sit in the background and be just as useful at 300 polygons as it would a little bit further up or where you might need to see the detail," Wallock notes. "Something that's in the background that you're not going to get close to doesn't need all that extra baggage."

But in the quest for fewer polygons, be careful when choosing models. "Having a low num-

ber of polygons is one thing, but having a low number of polygons where the polygons are actually structured correctly and in the right places is not as easy as it might seem," says John Mellor, vice president of business development at Viewpoint.

Depending on your application, you may not want to scrimp. Special effects for film or television require highly detailed models. For interactive apps like VR, games, or forensic animation, you can usually get away with less detail. "But if you want to do things that are going to render and have really nice shadows for raytracing and so forth, you really do have to have a lot of polygons to get it to look right," Wilson says.

Keep in mind the limits of your system, however. "The more complex the model is, the more memory it's going to take to use it on your system," explains Derek Evans, director of marketing at Acuris. "And even with an acceleration card, a really high quality scene of 100,000 to 200,000 polygons is probably going to really bring any PC system on

PREBUILT 3D MODELS

A PRODUCER'S PERSPECTIVE

ASSIGNMENT: Build an interactive game with 87 rooms in six environments, such as a castle or conservatory, during an eight- to 10-month development cycle.

SOLUTION: Call reinforcements.

That's what Cathy Perow, producer at Rez.n8 Productions, did. To build the sets for a game Rez.n8 is producing for Activision, Perow used a combination of custom 3D models, prebuilt models from a library, and models created inhouse. She contracted 3Name3D (also known as Yglesias Wallock Divekar or ywd) to create the architecture of 30 to 35 rooms. Rez.n8 provided sketches of the rooms and 3Name3D produced wireframe models of them.

"Through several meetings we would go room by room and describe the environment and the specific details we would need within that environment. We did this with ywd for several months, doing two to three or three to four rooms a week," Perow explains. "We hired them to do the rooms based on their expertise in architecture. They had gaming experience. In this case, they did not build those rooms to be re-sold."

When it came time to fill the rooms with decorations and props, 3Name3D's Cyberprops library helped meet the need. "The only thing we used the library for are props, because, as with any room in your home, there are things in each room. There is furniture. There are decorative items. You have to decorate the room to make it look lived in or give it a certain feeling. That is where the library came into play for us."

For Perow, the challenge was finding the right props. When 3Name3D's library didn't have everything she needed, the modeling company built

props that they would later add to their library. But sometimes a prebuilt prop just needed a little manipulation. "It's like going into a prop house and saying, well, I need a certain lamp. And if you hit on it, that's great. If you don't, and you see a lamp that may work that you can stretch and manipulate, then you're in business."

Control over the 3D models can be crucial. "You want as much as you can get because the size of these models, or the count of the polygons, is very important. If it gets too big it becomes cumbersome to work with," Perow says. "That's only the first phase of the process. You're only building and increasing from there. But those are standard considerations. For the most part, that was not really an issue with the props."

Perow estimates she saved hundreds of hours by using prebuilt models, which translated directly into money saved. Balancing the time and money equation is crucial from a producer's perspective.

"Certain objects are too involved to build, and it's worth it to purchase — you know, like a human figure. A human being is very difficult to build from scratch. If you can go to a catalog or a CD and go through a list of human figures, if you will, and just pick the ones you want based on the polygon count you need, you get it overnight. That could save weeks of production time. And that goes for props as well.

"The libraries are worth their weight because they save everybody weeks and weeks of production time. Having a group of people solely dedicated to creating models would be lovely, but with the production budgets the way they are these days, not too many projects can afford that luxury." ❧

most people's desks to a halt. You have to account for rendering time."

Formats

The range of file formats in which suppliers offer models varies. Some provide models in just a few file formats, while others can support any software. Ideally, you want to get models in a format native to the modeling system you're using.

Crestline's Humanoid collection is available in three formats: "3D Studio, Lightwave, and Imagine, and each one has been ported explicitly to those programs so they're ready to use," Wilson says. "You're not going to have to deal with turning the polygons and surface normals and all that other garbage you sometimes have to deal with when you buy objects in DXF or generic file formats. They do have areas in the geometry defined for the facial features, like the eyes, the pupil, the iris, the lips, the eyebrows, etc. Those are defined as separate areas so users can easily apply different materials to them."

3DS seems to be turning into a de facto standard for models. And Rendering Plant BBS specializes in converting shareware and freeware models to 3DS files. 3Name3D's Wallock adds, "A lot of software allows you to import a 3D Studio file. Form Z on the Macintosh has recognized that the OBJ file format is a compatible format and it holds its information very well. Same with Alias and SoftImage. The OBJ hook works really well there. As people start adapting to the 3DMF format, I think that'll be a real plus to the Mac users."

Traditionally, DXF files have been the cross-platform alternative. But they're not ideal. They don't usually hold as much information about the model: the file format doesn't carry texture information and only sometimes carries color information.

"Getting a DXF file in is not really hard, but



David's House from Acuris is a collection of 3D models of a colonial house and everything inside.

sometimes there's a lot of settings that you have to fiddle with to make sure that when you bring the model in it's brought in the way you want it," explains Evans.

Jim Lammers of Rendering Plant BBS offers this conversion suggestion: "The primary problem I've had as a 3D Studio user converting files is that sometimes there'll be too many faces on a given layer to import. I've got a problem with a mesh right now that's doing that. I can't get it converted. My second approach to attacking that is to use something like trueSpace. Now they're selling trueSpace/SE for a little under \$100. trueSpace can import about five different formats that are really good. So trueSpace, even if you don't use it as your animation or modeling

program, is a wonderful conversion utility. It can do Lightwave, Imagine, DXF, 3D Studio, and a couple others. It's a really inexpensive conversion utility compared to what else is on the market."

Moving Models

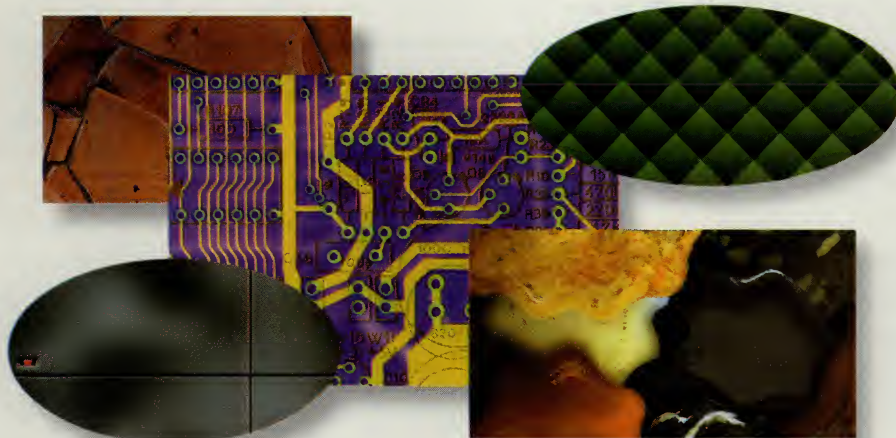
Need motion in your model? Want to use inverse kinematics (IK) on that human form? Brace yourself. You'll likely need to separate the model into individual objects or groups of objects and assign the hierarchy before you apply your IK program. Well detailed, articulated models built in logical groups with a hierarchical structure will make your job much easier.

Modeling and animation programs handle IK differently, and animation and hierarchy information is different for each application. Porting a model with link and animation data intact is fairly difficult.

"Currently, everybody's format is so different that doing something like that would almost require a generic IK format recognized by all the vendors," Ricks says. "That's not the case in the industry right now. We wish we could change that. We'd like to. But right now it just doesn't make any sense for us to try to support a hierarchy in all those different formats because everybody does it differently."

Most prebuilt 3D model providers don't include that information in the model. Those that do usually offer the model in a limited number of file formats.

Crestline's Humanoid models are available in Imagine, 3D Studio, and Lightwave; have a hierarchical, forward kinematics structure; and are designed to be animation-ready. Humanoid



Many sources offer texture libraries that can be used with 3D models. Here are textures from (clockwise top left) Wraptures Vol.1, Page Overtures Vol.2 (both from Form and Function), Artbeats Seamless Textures Collection (Artbeats), Terra Incognita (Texture Farm), and ScreenRez (TDC Interactive).

SHELL OIL'S DANCIN' CARS

TEACHING STOCK MODELS NEW TRICKS

Figure 1. Interactive it's not, but the story of how a wireframe model in Viewpoint's catalog like the one shown here turned into Shell Oil's dancing car TV spots is an interesting case study of how stock 3D models can be customized.

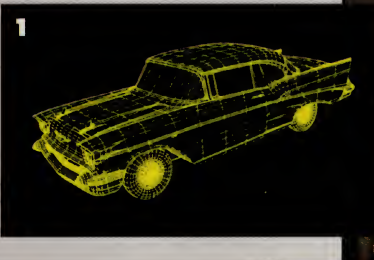


Figure 2. Around 10 different cars were needed for this Chicago blues spot. R/Greenberg Associates in New York didn't have time to do the modeling themselves, though they had 10 people working full time for 18 weeks producing a set of three 30-second commercials.



Figure 3. Other than the occasional Macintosh-based Photoshop touch-up and texture work, R/GA used SGI gear running SoftImage and their own proprietary software, Imrender. R/GA modeled the gas pump themselves. The wireframe of the car was purchased in SoftImage format and heavily manipulated.

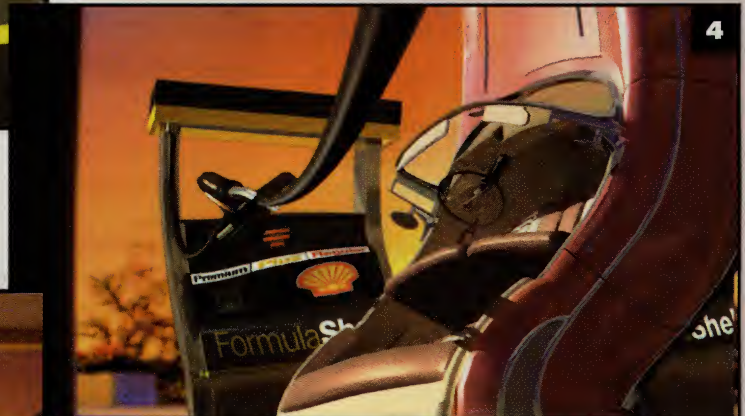


Figure 4. The car started life as a regular Cadillac that had a roof and no interior. Viewpoint customized the model by taking the roof off and adding the interior. "It's very, very rare," explains R/GA computer graphics director Mark Voelpel, "that we would ever use a model as is. You need to make certain modifications just to make it work for your specific production."



Figure 5. Because the cars had to bend and twist, high-resolution models were needed. "It's nicer if the model elements are separated — if the doors are separate parts of the hierarchy so that if you need to animate them or treat them differently, you can," Voelpel says. "Once we separated the parts we needed to separate, we built animation skeletons. Those skeletons controlled planes or sheets that were used to bend and twist the cars."



Figure 6. Economizing the polygonal database where possible was essential. In the Dance Fever spot seen here, the foreground car has much more detail than the mass of cars in the background.

models also can be used with inverse kinematics routines in programs like Imagine and 3D Studio.

"As soon as users load the model in, they can immediately begin manipulating the limbs into different poses and designing keyframes to build motion. The figures come with walking and running motions already keyframed. Those are ready to go. And they loop as well, so they can be made continuous," Wilson explains.

The human models in Acuris' collection also have an animation path for walking — but only in the 3D Studio version.

Viewpoint DataLabs have some motion datasets that could be attached to a model, and they have licensed and made available some models that contain walk cycles. "The Imagination Works stuff brokered through Viewpoint is filled with hierarchy and motion paths and morph targets in 3D Studio format," says Mellor. In other formats, the same models are available as jointed polygon meshes — the hierarchical linking, pivot points, texture mapping, and animation keyframes are only available for 3D Studio.

"We try to address those markets individually," Mellor explains. "We have people building some Bones models specific for that application. And we've got people building models for Kinemation from Wavefront."

If your model is in only one piece, to use inverse kinematics you'd need to break it up into separate objects and build joints. Another solution to manipulate single-skin objects is to use a vertex deformation tool like Bones Pro or Kinemation, which places "bones" inside the model so that when the bones are moved, they change the mesh, causing it to bend and flex. The animation usually needs to be applied to the bones by an inverse kinematics program or by keyframing. Some of Viewpoint's models are available with a "skeleton" that goes inside the model. You map motion to the skeleton, which then moves the models.

To Texture or Not To Texture

In the past, most prebuilt models arrived in

wireframe form. The buyer had to apply texture. Now, more and more suppliers are offering models with colors, textures, and materials applied. They're pretty much render-ready, so you can drop in a pretextured model and you're set to go. Don't like the texture they gave you? Fine. Take it off and apply your own.

For those models provided in wireframe, make sure the polygons are logically grouped. Says Mellor, "What we focused on from the beginning is making sure that grouping is done correctly so that the hierarchy and the assignment of materials and/or textures is really pretty easy. If you've got a car from Viewpoint and you go into the group list, you find that all glass is in one group. You can apply your glass material to it very easily. You can select the body parts that should all be red and apply a red. That makes the process pretty quick. The hierarchy goes quickly when your object's grouped out."

Sometimes the original modeler provides mapping coordinates, but that's largely dependent on the file format. Take Crestline's Humanoid, for example. "In the 3D Studio version, I set up all of the mapping coordinates on the limbs. If you apply material, it should map cylindrically onto each limb," Wilson explains.

Some models in Viewpoint's catalog include textures. The new Z-Art collection contains fully textured models. 3Name3D's models don't offer textures, though they may in the future. In the past, they stuck to wireframes because "I just cannot second guess whether you want a plaid chair or a floral design chair or just a straight color chair. You are going to spend more time redoing a texture map than replacing it," says Wallock. "It's a library and for that reason we felt like people would become more familiar with the product if they were able to make it their own. They would feel more comfortable using it, and they wouldn't have to worry about saying, 'If I use this chair, is my competition going to be using the same chair?' Every art director, every modeler, every animator has an idea of what they want their scene or environment to look like."

So why add texture in the future? "As you broaden your user base, there are certain things that appeal to different levels of users. Right now, we're not marketing to the lowest common denominator. We're out there going in from the middle and to the upper — the people who are producing titles right now. I don't think they're the people who will ever want their texture map. But some people will. The novice might not have all the tools necessary to do what they need to get the texture they want. It'll come out as an addition to the library. Right now we're talking that it'd be something you'd add to . . . you wouldn't necessarily buy the library with the

textures already on them. Some people just don't want them."

Tracking Textures


So you've got this great wireframe and you need texture. Most modeling packages include a library of textures, materials, and colors. But what if that's not quite what you want and you don't have the skills or resources or time or inclination to make your own? Varieties of marble, wood, brick, paper, fabric, and tiles, plus stuff like food, foliage, money, skies, and more are available on CD-ROM from a wide variety of suppliers.

Look for images that tile seamlessly — it'll be easier to map them onto 3D objects. Many collections have 100 or more images in a variety of file formats, sizes, and resolutions: PICT, TIFF, GIF, BMP, TGA; 72k to 18MB; 8-bit to 32-bit color; and resolutions from 756x512 pixels to 2048x3072 pixels. Prices generally range from \$99 to \$495. (See list on page 38 for more details.)

Most are royalty free, but if you're using the image in a product you'll be selling for profit, check first. Some companies may require you to negotiate a separate license in that case. David Wasserman, partner of Texture Farm, explains: "It's royalty free at the level that photo disc stuff is royalty free. What this means is that it's free for advertising, it's free for collateral, it's free in an editorial environment, and obviously any in-house use. If it gets into products where profit's going to be made, whether it's digital or print . . . if you look at these royalty free agreements closely, they don't allow for profit-oriented products without a fee. And they don't allow for resale of the image."

Some companies may have licensing agreements of their own with the original artist, so some additional limitations may be placed on what you can do with it. Others, like Form and Function, allow you to use their images as long as they're not the main source of your product's value.

Still haven't found what you want? Don't forget stock art as a possible resource. Some stock art and photo houses may also have images that lend themselves to use as textures. *[Watch for upcoming coverage of stock art as our Stock Media Series continues.]*

As more artists get into 3D computer graphics, high-quality textures will be in greater demand. "People who come out of an art background and move into computers bring a very different eye to the situation than people who come out of an engineering background and then decide to do art," says Wasserman. "The biggest group we've been selling to are people who are trained in graphic design and are doing stuff on computer. They're people who came out of an art background, and they're people who are very discerning about image quality and image content." 

CHECK IT OUT ONLINE

3DSite:

<http://www.3dsite.com/3dsite>

Animation Master Hobbyist:

<http://www.xmission.com/~gastown/animation/>

Avalon:

<http://www.viewpoint.com/avalon.html>

Gweb:

<http://www.cinenet.net/GWEB/>

Mesh Mart:

<http://cedar.cic.net/~rtlimann/mm/>

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READER SERVICE NO. 13

STOCK 3D MODEL & TEXTURE SOURCES

3Name3D

(aka Yglesias Wallock Divekar or ywd)
1202 W. Olympic Blvd., Ste. 101
Santa Monica, CA 90404
800.993.4621
310.314.2171
310.314.2181 FAX
info@ywd.com
http://www.ywd.com

3D models: Cyberprops — Medium- to low-resolution models of props in a variety of styles from categories such as outdoors, chairs, decorative, appliances and electronics, architecture, miscellaneous, lights, weapons, tools, household furniture, service and kitchenware, recreation, tables, cabinets and chests, and miscellaneous household items. Each volume includes these categories and contains over 100 polygonal models. Sold by volume on CD-ROM for DOS/Windows or Unix. Each CD-ROM contains all volumes — customer must call to unlock the volumes.

File formats: 3DS, DXF (DOS CD-ROM); Wavefront OBJ (Unix CD-ROM)
Licensing: Royalty free; title licensing available

Cost: \$395 per volume
Reader Service #119

Acuris

931 Hamilton Ave.
Menlo Park, CA 94025
415.329.1920
415.329.1928 FAX
3dmodels@acuris.com

3D models: ClipModel Library CD-1 — Over 100 polygonal models in a collection of six libraries: interior furniture & multimedia, exterior & trees, geography, human forms — male, human forms — faces, and human forms — female. Textures included. Sold on CD-ROM for PC and Mac.

File formats: 3DS, Topas, OBJ, Macro-Model, DXF

Licensing: Royalty free

Cost: \$249
Reader Service #120

Acuris

931 Hamilton Ave.
Menlo Park, CA 94025
415.329.1920
415.329.1928 FAX
3dmodels@acuris.com

3D models: David's House — 3D models of a 10-room colonial house furnished and decorated with 3D models. Models are polygon based and sold on CR-ROM for PC and Mac. 3DS and trueSpace formats come with materials and textures.

File formats: 3DS, trueSpace, DXF, OBJ

Licensing: Royalty free

Cost: \$299
Reader Service #121

Acuris

931 Hamilton Ave.
Menlo Park, CA 94025
415.329.1920
415.329.1928 FAX
3dmodels@acuris.com

3D models: AcuModels — Polygonal 3D models sold individually, including human anatomical parts, terrain maps, city, cars, military vehicles, aircraft, animals, sports equipment, medical, miscellaneous objects.

File formats: 3DS, Topas, OBJ, Macro-Model, DXF

Licensing: Royalty free

Cost: call
Reader Service #122

Artbeats Software

Box 709
Myrtle Creek, OR 97457
503.863.4429
503.863.4547 FAX
AppleLink: ARTBEATS

Textures: Texture images sold in collections — Leather & Fabric, Marble & Granite (and stone) 1 & 2, Wood & Paper, Marbled Paper Textures, Sample Images, Seamless Textures, Full Page Images, and Backgrounds for Multimedia. Collections provided on CD-ROM for DOS/Windows and Mac. Images range from 8-bit to 24-bit color and from 640x480 pixels to 5160x3360 pixels. File sizes are 320k-26MB. Individual images available as custom orders.

File formats: PICT, TIFF, BMP

Licensing: Royalty free, not for reseller use

Cost: \$99.95-\$349 per set
Reader Service #123

Asymetrix

110 110th Ave. N.E.
Bellevue, WA 98004
800.448.6543
206.462.0501
206.637.5802 FAX

3D models: Polygonal models of airplanes, cars, buildings, human figures, office objects, furniture, animals, geometric figures, frames, etc. Includes texture mapping, lighting schemes, surfaces, animation paths, and backdrops. Models are bundled with Asymetrix 3DF/X, which is available separately and bundled with IBM Thinkpad, Diamond Multimedia, Stealth Multimedia Accelerator, MGA Multimedia Super Pack.

File formats: DXF, 3DS, Asymetrix proprietary format

Licensing: Royalty free to users of 3DF/X

Cost: \$99
Reader Service #124

Autodesk

111 McInnis Pkwy.

San Rafael, CA 94903

800.879.4233

415.507.5000

415.507.5100 FAX

3D models: 3D Props Commercial — polygonal models of equipment, vehicles, tools, etc. 3D Props Residential — polygonal models of furniture and household items. Sets include lights and materials, and some articulation. Sold in collection on CD-ROM in ISO 9000 standard for PC and Mac.

File formats: DXF, 3DS

Licensing: Royalty free

Cost: \$199 per set
Reader Service #125

Autodesk

111 McInnis Pkwy.

San Rafael, CA 94903

800.879.4233

415.507.5000

415.507.5100 FAX

Textures: Texture Universe — minerals, water/ice, stone, plastics, metals, fabrics, etc. at 756x512 resolution. Sold in collection on CD-ROM in ISO 9000 standard for PC and Mac.

File formats: GIF, TGA

Licensing: Royalty free

Cost: \$149
Reader Service #126

Aztech New Media

1 Scarsdale Rd.

Don Mills, Ontario M3B 2R2

Canada

800.494.4787

416.449.4787

416.449.1058 FAX

Textures: Visual Rhythms, Abstract & Graphic Backgrounds, Watermarks & Ghosted Backgrounds — variety of images that can be used as textures. Sold in collections on CD-ROM. Watermarks collection has 25 images. Other collections have 100 images.

File formats: TIFF, Photo CD

Licensing: Generally royalty free unless used in a product for profit.

Cost: \$19.95-\$29.95

Reader Service #127

BeachWare

9419 Mt. Israel Rd.

Escondido, CA 92029

619.735.8945

619.735.8945 FAX

tomg@beachware.com

Textures: Texture images of rocks, earth, sky, plants, and wood in file sizes of 15MB TIFF and 1MB to 2MB PICTs. Sold in collection on CD-ROM for Mac and Windows.

File formats: PICT, TIFF, BMP, EPS

Licensing: Royalty free

Cost: \$14.95 (retail, discounts for direct sales)

Reader Service #128

CAD Technology

90 Louisa Chapel Rd.

Box 1117

Franklin, NC 28734

704.369.3979

704.369.3972 FAX

3D models: Polygonal models with surfaces of people, plants, and furniture. Models sold individually or in collection on disc.

File formats: DWG, DXF, DGN, DRW
Licensing: single, multi user, LAN, and site licenses

Cost: \$295

Reader Service #129

Caligari

1955 Landings Dr.

Mountain View, CA 94043

800.351.7620

415.390.9600

415.390.9755 FAX

3D models and textures: Polygonal models (texture mapping included) of people, furniture, buildings, cars, planes, household items, etc. Textures include wood, glass, and stone. Models and textures are sold individually, in collection on CD-ROM for Windows, and bundled with trueSpace2.

File formats: models DXF, 3DS; textures PICT, TIFF

Licensing: Royalty free

Cost: \$299 or free with trueSpace2

Reader Service #130

Clipshots

483 Eastern Ave.

Toronto, Ontario M4M 1C2

Canada

416.462.0112

416.462.1661 FAX

Textures: Textures of Italy — woods, marbles, textile, etc. Textures of Reactor — details of paintings and illustrations on various media. Resolutions range from 128x192 pixels to 2048x3072 pixels. File sizes range from thumbnails to 18MB. Sold in collection on CD-ROM for PC, Mac, and Unix.

File formats: Photo CD

Licensing: Royalty free

Cost: \$225

Reader Service #131

Corel

1600 Carling Ave.

Ottawa, Ontario K1Z 8R7

Canada

613.728.8200

613.761.9176

http://www.corel.ca

3D models: 600 3D models covering a wide variety of themes. Models are bundled with Corel Draw 6 for use within the Corel Dream 3D module.

File formats: DXF

Licensing: Royalty free

Cost: \$695

Reader Service #132

Crestline Software Publishing

Box 4691
Crestline, CA 92325
909.338.1786
76432.1122@compuserve.com
3D models: Humanoid — models of a man, strong man, woman, and child sold in a set. Includes pre-assembled hierarchies with articulated limbs, walking and running motion files, morph targets for facial features.
File formats: 3DS, Lightwave, Imagine
Licensing: Commercial use of renderings and animation permitted. Cannot include Humanoid geometry in application that's being distributed without special license.
Cost: \$195
Reader Service #133

Crestline Software Publishing

Box 4691
Crestline, CA 92325
909.338.1786
76432.1122@compuserve.com
3D models: Kinemodelz — models of humans and animals using seamless geometry. Support for skeletal deformation and inverse kinematics routines. Models sold individually.
File formats (planned): 3DS, Lightwave, Imagine
Licensing: based on use
Cost: To be announced — first model expected early 1996
Reader Service #134

Crystal Graphics

3350 Scott Blvd., Bldg. 14
Santa Clara, CA 95054
408.496.6175
408.496.0970 FAX
3D models and textures: Polygonal models (with hierarchy) of plants, furniture, household accessories, earth/globe, etc. Texture and reflection mapping included. Textures include wood, marble, clouds, reflection images, etc. Sold in collection as Crystal Gems CD-ROM and bundled with Crystal Flying Fonts Pro 3.0.
File formats: models GRP, MDL; textures TGA, TIF
Licensing: Royalty free
Cost: Crystal Gems CD-ROM, \$99; as part of Flying Fonts Pro, \$245
Reader Service #135

Form and Function

1595 17th Ave.
San Francisco, CA 94122
800.779.5474
415.664.4010
415.664.4030 FAX
wraptures@aol.com
Textures: Wraptures One and Two — Seamless, tileable photographic images of sky, space, paper, marble, wood, plants, stone, fabric, etc. (130 images per volume in five sizes). Images range from 640x480 pixels to 1024x512 pixels. Color is 32-bit, 8-bit optimized, and 8-bit Apple Palette (Mac only). Page Overtures One and Two — High resolution, full-page background textures of sky, fabric, plants, food, glass, rock, marble, met-

al, paper, wood, circuits, money, water, etc. (100 per volume). Images are 24-bit color in 640x480 pixels, 1875x1250 pixels at 266dpi, 9x12 inches at 72dpi, and 9x12 inches at 266dpi. Wraptures and Page Overtures sold in collection on CD-ROM for PC, Mac, SGI.
File formats: PICT, BMP, TIFF
Licensing: Royalty free
Cost: \$129 per volume
Reader Service #136

FotoSets

4104 24th St., Ste. 425
San Francisco, CA 94114
415.621.2061
Textures: Textures and backgrounds of artistic painted sets, sold as a collection on CD-ROM for PC, Mac, and Unix.
File formats: Kodak Photo CD
Licensing: Single user only. May be used unlimited times within parameters of advertising and graphic design marketing and collateral pieces. May not be resold as art or redistributed in a product without prior permission.
Cost: \$199 per volume of 100 images
Reader Service #137

Imagetects

7 W. 41st Ave., Ste. 415
San Mateo, CA 94403
408.252.5487
408.252.7409 FAX
imagetects@aol.com
Textures: Seamless and tileable textures of brick, stone, marble, tile, wood, water, sky, groundcover, building surfaces, people, trees, cars, etc. Sold individually; in collection on CD-ROM for PC/Win, Mac, Amiga, Unix; and bundled with Crystal Graphics Kaleidoscope. Textures are also sold online.
File formats: TGA, TIF, PICT, BMP, PCX, GIF
Licensing: Royalty free, single user (not to be used on network)
Cost: \$10 to \$495
Reader Service #138

KETIV Technologies

6601 N.E. 78th Ct., Ste. A8
Portland, OR 97218
800.458.0690
503.252.3230
503.252.3668 FAX
3D models: 600 blocks of people, plants, furniture, cars, aircraft, buses, watercraft, playground, parks, masonry, specialty computers. Pre-linked material textures included. Sold individually, in collection on CD-ROM, and bundled with ARCHT Architectural software for AutoCAD.
File formats: 3DS, DWG, DXF
Licensing: Royalty free
Cost: \$199
Reader Service #139

Magellan Geographix

6464 Hollister Ave.
Santa Barbara, CA 93117
800.929.4627
805.685.3100

805.685.3330 FAX
CompuServe: GO MAGELLAN
3D models: 3D GeoModels — more than 600 maps of the world (including major continents, countries, states, and provinces) that include multiple layers of cartographic information. Models are polygon based and include texture mapping. GeoModels are sold individually and as a collection. They are available via CompuServe or directly from Magellan or Viewpoint DataLabs. (Magellan's MGDigitalEarth, a collection of high-resolution satellite maps of the world, can be used as texture maps on the 3D GeoModels. Satellite maps cost \$25-\$400 and come in Freehand or Adobe Illustrator formats.)
File formats: Over 70 formats available
Licensing: Royalty free (unless used in a project in which the map is the main interface)
Cost: \$100 to \$1,000
Reader Service #140

Media Synergy

260 King St. E., Ste. 403
Toronto, Ontario M5A 1K3
Canada
416.369.1100
416.369.9037 FAX
askme@mediasyn.com
3D models: 120 polygonal models of furniture, spacecraft, buildings, frames, cars, etc. Hierarchy and textures are included. Models are bundled with VR Workshop Plus.
File formats: VR Workshop Plus imports DXF, TIFF, 3DW, BMP, TGA, GIF, PCX; and exports FLI, FLC, ANI, BMP, PCX, TGA, GIF, TIF, POV-Ray
Licensing: Royalty free
Cost: \$9.95
Reader Service #141

MetaTools

6303 Carpinteria Ave.
Carpinteria, CA 93101
805.566.6200
805.566.6385 FAX
meta_sales@hsc.com
Textures: Images of wood, leaves, bark, grass, sky, plants, vegetables, brick, graffiti, sports equipment, nostalgia, kids, toys, bugs, holidays, hot rods, etc. sold on CD-ROM.
File formats: TIFF
Licensing: Royalty free
Cost: \$199 for five-volume set
Reader Service #142

NEO Custom Painted Environments

2000 W. Fulton St.
Chicago, IL 60612
312.226.2426
312.243.8302
Textures: NEO-Canvas — 75 hand-painted textures in five image sizes up to 2048x3072 pixels. Sold on CD-ROM.
File formats: Photo CD
Licensing: Royalty free
Cost: \$199.95
Reader Service #143

New World Graphics

503 S. Warminster Rd., Ste. W-6
Hatboro, PA 19040
215.871.3100
215.871.3101 FAX
newworld@internetmci.com
3D models: Surface models (polyline and NURBS based) sold in collections of residential furniture and furnishing (including cabinets, appliances, faucets, fixtures, etc.), executive and commercial office furniture, human figures/clothes, floor coverings, trees and plants, antique furniture and furnishings, and cars. Collections contain from four models to 357 models and are provided on 3-1/2-inch diskettes or CD-ROM.
File formats: DXF, DWG, DW3
Licensing:
Cost: \$49.95 to \$300
Reader Service #144

People for People Software

Box 432
Laguna Beach, CA 92652
714.497.9610
714.497.2284 FAX
3D models: Polygonal models of people in sets of 10 to 80 models. Models are static, without hierarchy, and ready to render in 3D Studio AccuRender and all AutoCAD-based rendering tools. Sold individually and in collection on CD-ROM.
File formats: 3DS, DWG, DXF (all formats on each CD-ROM)
Licensing: Some restrictions
Cost: \$195 to \$395 per set
Reader Service #145

Pixar

1001 W. Cutting Blvd.
Richmond, CA 94804
510.236.4000
510.236.0388 FAX
Textures: Photographic, seamlessly tileable textures created from original material samples. Pixar One Twenty Eight includes 128 images, and Pixar Classic Textures Vol. 2 contains 100 images. Textures are 512x512 pixels in 24-bit color and 128x128 pixels in 8-bit color. Thumbnails are also included. Sold on CD-ROM for PC, Mac, and Unix.
File formats: TIFF
Licensing: Royalty free
Cost: \$169
Reader Service #146

Ray Dream

1804 N. Shoreline Blvd.
Mountain View, CA 94043
415.960.0768
415.960.1198 FAX
support@raydream.com
3D models: 500 fully textured B-spline-based models bundled with Ray Dream Studio.
File formats: Ray Dream Designer format
Cost: \$499 for Ray Dream Studio
Reader Service #147

Rendering Plant BBS

816.525.8362 v.34
816.525.5614 v. 32
816.525.0103 VOX

816.525.1594 FAX
trinity@sky.net
73261.66@compuserve.com
3D models: Hundreds of 3D models, often of nonorganic objects, converted to 3DS format. Textures also available.
Licensing: Freeware and shareware models
Cost: Annual subscription to BBS is \$48 per year and provides 60 minutes per day for unlimited downloads.
Reader Service #148

Specular International

479 West St.
Amherst MA 01002
800.433.7732
413.253.3100
413.253.0540 FAX
<http://www.specular.com>
3D models and textures: Replicas — over 600 models and surfaces sold on CD-ROM for Mac covering 13 volumes: office furniture, lamps and chairs, starter surfaces (procedural surfaces), exotic woods (image maps), packaging, patterns (image maps), transportation 1 (road and rail), transportation 2 (air and sea), marbles (image maps), dinosaurs, star ships, humanoids, and human characters. Models are polygon based, articulated, and animatable. Image maps are tileable, resolution independent surface textures.
File formats: models DXF, Infini-D 2.6; textures PICT
Cost: \$149
Reader Service #149

Strata

2 W. St. George Blvd.
St. George, UT 84770
801.628.5218
801.628.9756 FAX
<http://www.strata3d.com>
3D models and textures: Strata Clip 3d — over 40 libraries containing 1,300 textures and shapes, including furniture, aircraft, vehicles, human anatomy, animals, sports equipment, metal, marble, wood, paper, alien skin, etc. Sold on CD-ROM and bundled with all 3D apps from Strata.
File formats: 3DMF, Strata format
Licensing: Royalty free
Cost: \$99 per library
Reader Service #150

Strata

2 W. St. George Blvd.
St. George, UT 84770
801.628.5218
801.628.9756 FAX
<http://www.strata3d.com>
3D models and textures: Secrets Clip — library of 170 shapes and textures from *Secrets of the Luxor Pyramid* game, including statues, pillars, serpents, etc.
File formats: 3DMF, Strata format
Licensing: Royalty free
Cost: \$249
Reader Service #151

Syndesis Corp.

235 S. Main St.

Jefferson, WI 53549
414.674.5200
414.674.6363 FAX
syndesis@inc.net
3D models and textures: Polygonal models (most hierarchical) and textures of a variety of objects. Detail ranges from 200 to 50,000 polygons. Sold in collection on CD-ROM.
File formats: DXF, 3DS, Wavefront, Lightwave, Imagine
Licensing: No restrictions
Cost: \$99.95
Reader Service #152

TDC Interactive

2716 Ocean Park Blvd., Ste. 3085
Santa Monica, CA 90405
310.452.6720
310.452.6722 FAX
lberzins@aol.com
Textures: Imagekit, a collection of 10 high-res CD-ROMs, and ScreenRez, the same collection at screen resolution, contain many texture images of sky, water, earth, foliage, cities, objects, and miscellaneous images. Available on CD-ROM for Mac (PC in development).
File formats: PICT in high resolution and screen resolution
Licensing: Royalty free for all uses, even in products for resale. Not to be resold as part of another image collection.
Cost: Imagekit, \$1,295; ScreenRez, \$149.95. Single CD-ROMs range from \$179 to \$249
Reader Service #153

Texture Farm

Box 460417
San Francisco, CA 94116-0417
415.284.6180
415.285.4359 FAX
Textures: Terra Incognita — collection of 100 images, including abalone, lizards, rock, feathers, vegetation, and flowers. Collection is based on 18 photographs that have been digitally manipulated to produce different interpretations. Sold on CD-ROM for Windows and Mac. Resolution ranges from 128x192 pixels (72K) to 2048x3072 pixels (18MB). Terra Firma (landscapes) expected in late '95/early '96.
File formats: Photo CD, PICT
Licensing: Royalty free
Cost: \$99.95
Reader Service #154

TOTO Multimedia

4065A N. Calhoun Rd., Ste. 101
Brookfield, WI 53005
800.278.6861
414.783.2400
414.783.2410 FAX
toto@execpc.com
Textures: TOTO Textures Collection Volume 1 — 200 images of marble, stone, wood, glass, textiles, paper, nature, etc., 48 seamless image tiles, and dozens of bullets, buttons, panels, and sliders. All images are at 72dpi resolution, range from 640x480 pixels to 1280x960 pixels, and are in 8-bit and 24-bit color.

Sold individually, in collection on CD-ROM for Mac, and bundled (8-bit images only) with Macromedia Authorware (Mac and Windows). Images will soon be available online via TOTO's Web site.
File formats: PICT and JPEG
Licensing: Royalty free
Cost: \$99
Reader Service #155

The Valis Group

Box 831
Tiburon, CA 94920
415.435.5404
415.435.9862 FAX
valisgroup@aol.com
Textures: Rainsound Tileable Textures Vol. 2: Materia Prima CD-ROM contains 100 original seamless tiles of organic materials and other textures. The set includes grayscale versions for bumpmapping and displacement. The CD-ROM is ISO compatible for PC, Mac, and Unix (SGI).
File formats: TIFF
Licensing: Royalty free
Cost: \$249
Reader Service #156

Viewpoint DataLabs

625 S. State St.
Orem, UT 84058
800.328.2738
801.229.3000
801.229.3300 FAX
<http://www.viewpoint.com>
3D models: Over 3,000 polygonal models in categories such as aircraft, anatomy, animals, architecture, characters, dinosaurs, landmarks, military, space, sports, vegetation, vehicles, watercraft, collections, geography. Some include texture maps and motion sets. Models sold individually or licensed per project. Real-Time Datasets of aircraft, watercraft, vehicles and other items are 3D polygonal wireframe models that have been optimized for realtime applications (texture maps and additional levels of detail available). Motion sets of dance, kick/punch, sports, upper body, walk/run, and miscellaneous also available. Models available directly from Viewpoint, on CD-ROM, and online via Viewpoint's Web site.
File formats: Over 70 formats available
Licensing: Per project. Title licensing available (approx. \$10,000 per title).
Cost: \$25-\$2,895
Reader Service #157

Viewpoint DataLabs

625 S. State St.
Orem, UT 84058
800.328.2738
801.229.3000
801.229.3300 FAX
<http://www.viewpoint.com>
3D models: Z-Art — 1,000 fully textured, B-spline-based 3D models of various icons, characters, and props. Some models are bundled with 3D software from Corel and Ray Dream. The models will be available directly from Viewpoint in early 1996.

File formats: Adobe Dimensions, Alias Sketch, Apple QuickDraw 3DMF, Autodesk 3D Studio, Caligari trueSpace2, ElectricImage, MacroMedia Macro-model, Ray Dream Designer, Specular Infini-D, Strata Studio Pro, DXF, others.
Licensing: Royalty free
Cost: To be announced early 1996
Reader Service #158

Visual Software

21731 Ventura Blvd., Ste. 310
Woodland Hills, CA 91364-1868
818.593.3500
818.593.3700 FAX
kbvisual@aol.com
3D models and textures: Volume I, Simply Scenes: Starter Pack — chess scene with chess tables, chess sets, and park benches; cafe scene with marble tables, wire chairs, and buildings; dining room with a long table, wooden chairs, and food; locker room with rows of lockers, towels, and sports equipment; park scene with grassy knoll, playground equipment, and baseball diamond; beach scene, island with a pier, surfboards, picnic food, and seashells. Volume II, Simply Scenes — Medieval castle with parapets, courtyards, and dungeons. Volume III, Simply Scenes — Pacific Beach — half mile of beachfront, pier with telescopes and benches, restaurant on pier with booths and tables, picnic area, etc. Models are polygon based. Textures for Professionals — 420 high resolution seamless textures of stone, river rocks, adobe, flowers, wood sidings, fences, granite, laminates, vinyls, water, food, fabrics, floor coverings, tiles, metals, wallpapers, paints, print, plants, shingles, stripes, clouds. Sold individually, in collection on CD-ROM, and bundled with Visual Reality 2.0.
File formats: DXF, 3DS, OBJ, TGA, TIFF
Licensing: Royalty free
Cost: Textures for Professionals, \$149; Simply Scenes, \$49
Reader Service #159

Zygote Media Group

3344 Oak Cliff Dr.
Salt Lake City, UT 84124
801.278.5934
801.278.6304 FAX
Dan@zygote.com
3D models: Polygonal models of human figures and anatomy, animals, furniture, ships, spaceships, etc. Models are ready for kinematic as a seamless object and are available as jointed models. Some hierarchy is available in 3D Studio models. Sold individually on FTP, 3-1/2-inch disc, 4mm DAT, modem.
File formats: DXF, 3DS, OBJ, HRC, COB, LWO, others
Licensing: Royalty free, licensed only to the user and may not be transferred to others
Cost: Varies, single human figures \$495
Reader Service #160



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global development

a guide to loCaliZing cd-roms for distribution in foreign lands

if you were in England last summer, sitting in the sweltering heat of an abnormally warm summer and thinking about the international stakes of multimedia development were not activities to be endured for long periods of time. You see, everywhere you went people were more interested in pointing out the obvious — it's bloody hot and sticky! Perhaps that's why business was so slow for a lot of CD-ROM distributors. After all, what right minded, sun deprived Northern European is going to miss out on one of the hottest summers in a hundred years to sit in front of their PC, knowing full well that the only form of air conditioning available to the average Euro-techie is a naked nap in the frozen food section of the local supermarket? ● So it is with much sweat and angst that I must begin to preach about the importance of making it in the global marketplace, and use Europe, with all its cultures and languages, as a base. No place on earth is so eager

I L L U S T R A T I O N B Y H A N K O S U N A

B Y O M I D R A H M A T



to appear homogenous, and no place is so diverse at the same time. For Americans, this can't be any more evident than in the immediate differences between their own tongue and that of the British. While *Baywatch* is easily understood in suburban London, try telling an Englishman that color is actually colour and that a zee is the same as a zed.

The high cost of production and marketing makes it imperative that any CD-ROM title is available to as many potential users as possible. If shelf space and channel development are so inadequate for the needs of the great mass of developers who don't have the clout of a Brøderbund or Mindscape, then why do so many seemingly ignore the needs of the global marketplace?

Perhaps it has something to do with the low potential for volume sales in markets outside of North America. French distributors, for example, are happy if one of their titles achieves

1,000 unit retail sales in a year. Hardly the stuff that dreams of worldwide publishing empires are made of, but this is a market that is just beginning to kick in. The *Louvre* title in France is claimed to have sold in excess of 25,000 units, so maybe there's more than meets the eye. Okay, it's a home grown product with an obvious appeal to the French user, but it sold pretty well by anyone's standards.

In neighboring Italy the installed base of multimedia computers is now higher than in France, but there are no comparative figures for a sale of any title. Go to England and the woes of trading there are compounded by the fact that indigenous talent is strong and prices veer toward the sub \$20 range. Any higher and you have to change your name to Dorling Kindersley if you want anyone to buy your stuff. I could go on about the powerful German market, but this is supposed to be a rousing piece on the joys of international multimedia trade and I may be shooting myself in the foot pointing out the realities of life. Let's just hope the weak of will have been weeded out.

Localization

If you want to sell to the Brits, French, and Germans, you have to make them understand

exactly what you are selling. That means localizing your product, and that isn't a euphemism for translation. Translation is only one step in the localization process. Localization can be performed at one of two points: when the product is finished, or while it is being developed. Surprisingly enough, only 30% of products tend to be adapted for foreign markets during their production stage. Sometimes a product is deemed unsuitable for foreign markets, but lack of foresight is the main reason products are not localized during the production stage.

Of course, it can be very difficult for developers facing escalating costs and dwindling resources to plan localization into their development schedules. That's understandable, but developers are increasingly becoming aware that a global perspective can help to make their product more attractive to North American publishers with offices dotted across the continents.

For developers working in countries like Britain and France, where markets are relatively small, their only chance of success is in having a global perspective. Is the CD-ROM market any different from the entertainment industry, where foreign receipts can represent half of a product's total sales? Not for much longer.

Stepping through the Process

The localization process can be broken into five separate stages: translation, adaptation, modification, correction, and support materials. Translation is the most obvious task and is often mistaken for the complete localization process. In fact, it only represents about 25% of the process. Translating is a trade in itself. It's best not left to "a friend who lived in Paris for a couple of years," and it extends to translating American english to English english, especially in educational products.

You'll want to take the time to present the product to your translator in detail. This stage is extremely important. Make sure your translator knows the subject (not everyone is familiar with the subtleties of Cistercian art) and the type of console or computer the program is to be used on, so they use the correct terminology and don't confuse the user. Just think about the differences between the Mac and PC cultures.

Multimedia products have textual information, audio visual information, and interactive elements that all require adaptation to the local marketplace. What raises a laugh in Idaho may be unsuitable in Salzburg, and references to people and places cannot appear obscure to the locals. For audio scripts the choice of voiceover artist can represent a real headache if a recognized U.S. personality is used. Suffice to say that Howie Mandel isn't Hans Mandel on the German adaptation of *Tuneland*. And don't forget that in some cultures it's considered impolite to point and click from the left. Adaptation is a vital element in ensuring that your product

The Localization Food Chain

The Developer produces the product. Authors, artists, and programmers work for the developer. In rare circumstances, the developer will localize a product at the outset and target foreign distribution, but normally that responsibility is left to the publisher. Developers that are financed largely by their publisher tend to have little control over international rights. Some developers try to keep North American rights separate from others, hoping to make more lucrative arrangements themselves. Unfortunately, because economies of scale don't exist and support costs are high, developers often make demands that cannot be met in Europe at this time. Small developers suffer most in this regard.

The Publisher finances, markets, and supports product. The publisher will either handle the localization directly or through a company they've contracted with in the target country. The company in the target country is charged with the task of setting up local distribution. For example, LucasArts has managed to successfully set up associations with Funsoft in Germany and Ubi Soft in France. These companies have a franchise to publish the LucasArts titles in their local markets, and they work closely with LucasArts to ensure that fully localized versions are available in their home markets at around the same time as the U.S. version hits the streets. Few companies do it better and more successfully in the PC market.

The Distributor assumes responsibility for promotion, sales, and support. The distributor offers to bear the costs of localization in exchange for some sort of exclusivity in the local market. Bomico in Germany is one company that has managed to negotiate such agreements. The lines between distributor and publisher are becoming increasingly blurred. It's all a matter of size: large publishing concerns can set up distribution agreements with companies such as Ubi Soft, which may in turn be publishers for other, smaller, companies in France.

Buried in Time, a successful CD-ROM adventure game in the U.S. (see the case study in *InterActivity*, July/August 1995), will soon appear in versions localized for Germany, Spain, and France. The French version is being done by the SRC Group, a Paris-based company. SRC handles most aspects of localization, including translation, layout, dubbing, testing, handbooks, packaging, and quality assurance, among other things. They have adapted more than 300 titles.

In all, five translators, six proofreaders, two game testers, five actors handling about 15 voices, and a model maker took part in the localization of *Buried in Time* in the course of six weeks (plus four days of audio studio recording time). The result: 2,000 recorded audio files and 21 translated text files. In addition, SRC have adapted and localized all the packaging and marketing materials on behalf of the European publisher.

"The SRC Group," emphasizes its artistic director Guillaume de Petigny, "wanted to give this product a typically French touch." A great deal of the adaptation involved the voice of Arthur, the artificial intelligence that accompanies the player throughout the game. This represents one hour of audio recording. American humor was replaced with French humor, and the North American cultural references were changed to French ones. So, for example, Elvis Presley becomes Claude Francois. Arthur even talks about "Jean Reno accompanied by his faithful Jacouille," a reference to the French movie *The Visitor*. At one point, the original Arthur pours out insults for no reason. The French character, on the other hand, lets slip his passion for Tintin and Captain Haddock (two comic book characters famous across Europe).

Some of the problems SRC encountered on this project were familiar to them from their previous work. Take acronyms, for example. *Buried in Time* has two interesting ones: TSA for Temporal Security Agency and DTU for Deep Time Unit. SRC either could have translated them literally or invented new ones while keeping the same monikers. They chose the latter and thus TSA became Troupes de Securite Atemporelles and DTU became Departement des Troupes d'Urgence. Changing the acronyms would have created problems for Presto Studios, the developers of *Buried in Time*. The resultant translations would have made no sense without changes to key scenes and graphics elements. This kind of attention to detail is critical to the success of a localization project.

The original version presents an in-depth history of Chateau Gaillard, and so did the localizers. They managed to correct some errors (the Americans had mistakenly located Angers in Normandy) and to modify the style somewhat. On a medieval parchment, the French version takes on a medieval style. On a newspaper, the French version takes on a journalistic tone. In addition, the American packaging refers to an earlier CD developed by Presto, *The Journeyman Project*, which was successful in the U.S. This title does not exist in France, so it was better not to refer to it on the packaging and confuse the French buying public.

The French version of *Buried in Time* is expected by Christmas '95. The commitment of the publishers and developer to the localization process should prove well justified. If nothing else, the developers at Presto are keen to take advantage of the experience they gained localizing *Buried in Time* with SRC to streamline and enhance the process on upcoming titles.

is going to be competitive in its target market, and the adaptation process is most successful if you use personnel experienced in the multimedia sector of your target market.

The technical part of adaptation is the modification of all the text, audio, and visual files. As multimedia software advances, it requires greater thought on the part of the localizers to ensure that the spirit of a piece translates across cultural barriers. It would be a shame to have such hard work damaged by technical deficiencies in the final product. There is a certain expertise, somewhat rarer than you might imagine, in dubbing QuickTime video. European consumers are increasingly frustrated by what they perceive to be a lack of quality in the multimedia products they buy. They have unfortunately been victims of excessive hype, and with markets as tight as they are, quality is of utmost concern to sellers and buyers alike.

During the correction phase, integration and testing tasks may be separated by thousands of miles. In most cases, where the technology is proprietary or confidential, the developers integrate the translated files. Then comes a series

Distribution of Localization Costs

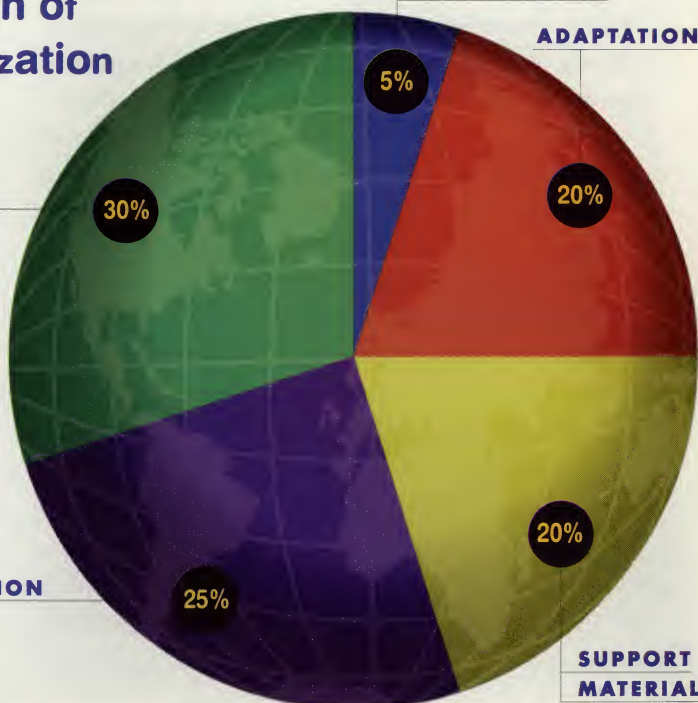
MODIFICATION

TRANSLATION

TESTING

ADAPTATION

SUPPORT MATERIALS





of to-ing and fro-ing as the product is tested in the local market and amended at the production offices. In cases where standard applications are deployed, as with Macromedia Director, the integration may be more effectively handled in

the local market. The tests undertaken by the localization team are not as exhaustive as those undertaken during the creation of the original disc. In effect, they are restricted to verifying the coherence of the localized product.

This step corresponds to proofreading the first set of proofs in the publishing field. It's interesting to note that typographical rules are not the same in all countries. In France, for example, you're supposed to put a half-space in front of semicolons, colons, and question and exclamation marks, whereas in English you connect the punctuation to the preceding word.

Oft neglected in the localization process is the adaptation of user manuals, packaging, marketing materials, and demo files. Producers tend to treat these elements as extras. These materials are important, however. They're often the only documents that users and salespeople will see of the product. Clear and attractive packaging, good documentation, and strong sales support materials may not be enough. They do not translate well for certain products. *Mortal Kombat* may require very little adaptation, but the novelty of multimedia software to new computer users makes it necessary to be clear about the

polyglot: speaking in tongues

B Y G R E G R U L E

The hour is at hand. A grim-faced investment group has flown in to view your interactive CD-ROM prototype for the first time, and your heart is hammering double time. Their pockets are deep, their distribution channels flow like superhighways into major international markets, and they're almost ready to ink a deal that'll put you on Easy Street. But before they'll sign the dotted line, they have one small request: "We'd like the product in English, French, Italian, German, and Japanese. Can you show us working versions of each in, say, four months?" Gulp!

Sounds like a job for the folks at Polyglot.

Founded in 1983 by Raphael Baron, Polyglot has carved a deep niche for itself by establishing cross-cultural links for clients of all types: Chevron, Bristol Meyers, DuPont, Lockheed, Texaco, Maxis (makers of *Simm City*), the *Discovery* network, and even the U.S. Department of Energy. With offices in San Francisco, Minneapolis, Moscow, London, Berlin, Almaty (Republic of Kazakhstan), and Tokyo, they've become the world leader in localization.

"We call ourselves global managers of language-related projects," explains Baron. "What that means is that we as an international company recognize the cultural and linguistic differences between the countries and the peoples and the nations. We see our job as to manage projects that involve changing the language, and therefore the cultural context of, say, a document or a piece of media, so it is not only linguistically correct, but also culturally correct."

Localization isn't restricted to the world of over-the-counter CD-ROMs. It can be experienced in many different environments, on many different levels. If you live in a multi-cultural hub, for example, you might have interacted with an ATM machine that offers a choice of several onscreen languages. Or if your company has conducted business with clients abroad, perhaps audio/visual presentations have been localized for specific native languages.

On the day we spoke to Baron and Polyglot's marketing director Jennifer Colamonico, they were putting the finishing touches on an educational CD-ROM for the *Discovery* network. "It was originally created in English," says Baron, "but we localized it for future sale in France and Germany. As with any multimedia, this CD included visuals, audio, music, sound effects, and anything that any interactive product usually has. So when one localizes multimedia, it is not just translation of text, but rather a conglomerate of processes and steps that need to be taken."

For the *Discovery* project, those processes included extracting the text, checking the cultural content (making sure nothing was potentially offensive to the target audience), translating it, hiring foreign voice talent for narration, then synchronizing the new material to the pre-existing visuals. "We also had to see if all the words, when translated, would actually fit on the pieces of graphic material that were allocated for them," Baron explains. "And the answer this time around was, unfortunately, no. In other words, when something gets translated into, say German, it gets expanded. So when you have a visual button that you need to click on that says STOP or GO in English, it may or may not be as short or concise in German, French, or any other language. This, in turn, means that we have to redo the visual buttons, delete the existing text, and substitute the new symbols. We have to design symbols and icons that will be understood in Germany and in France and reinsert them back into the visual portion of disc."

What should developers keep in mind to make their products more localizable? "What we always tell our clients, whether in multimedia, software, or even in documentation," says Baron, "is to come to us and talk to us while they're starting to write their product so it becomes localizable." Polyglot's basic checklist includes the following:

Avoid the use of culture-specific idioms. "In writing something that is localizable, think: Is it going to be acceptable in another language? Language does not exist independently of culture," Baron stresses. "It's only meaningful against the background of culture. In Scan-


product. The amount of localization must be weighed against the market potential of a product. It's more than a financial consideration.

The Cost of Localization

Localization may add as much as 12% to overall production costs. However, localization companies in Europe are fully aware of the need to keep costs down when considering the size of local markets. They are also keen to emphasize the need for developers to keep tight control on localization themselves rather than passing that responsibility to distributors. This ensures

a better quality product and allows the localization process to be incorporated into the original production schedules.

It also means greater flexibility with rights issues and distribution. European publishing and distribution partners are often reluctant to assume responsibility for localization if they cannot see a quick return on their investment or if they are not guaranteed extensive rights over the localized version. This makes it increasingly difficult for smaller developers to break into international markets that may prove to be profitable for them. More important than

anything else is the realization that badly localized product only incurs the ridicule of the local press and consumer. 

ABOUT THE AUTHOR

InterActivity contributing editor Omid Rahmat thinks all French waiters are not bad, tea is a more civilized drink than coffee, The Swiss navy is a force to be reckoned with, and the moon is made out of cheese.

dinavia, for example, if someone says it's cold, it doesn't necessarily mean that it's *cold*. What's cold for us may be actually very warm for a Scandinavian. So there has to be some cultural context behind the word. We examine the product as it's being written and advise our clients on the things they need to think about. We teach them how to ask the right questions."

One example: Polyglot recently evaluated an electronic baseball game that was being considered for release in Japan. "The scoreboard looks somewhat different in Japan," says Baron, "and this is something you need to know. From that you make an educated decision: Yes, I'm going to keep the scoreboard the same way it is in the U.S., and perhaps add some sex appeal to my product in Japan. Or no, I'm not going to keep it that way. I'm going to redo the scoreboard for the Japanese market so it looks very, very local. It's a decision that needs to be made."

Keep voice tracks and sound effects tracks separate.

"Often times they all end up on the same track," says Colamonico, "and then it's very difficult to go back. It's important to document everything and keep them separate so they can be pulled apart easily and then put back together."

Leave ample space in both your video and audio, allowing for expansion.

Baron tells us, "English is, in fact, the most concise language in many cases, and when going into another language, things tend to expand. So when you do your visuals and audio, make sure you leave enough space for the visuals and enough time for your audio so it can be narrated in a foreign language." Adds Colamonico: "In CD-ROMs, people often use up the entire space available on the disc, but that can make it very difficult to adapt it to foreign languages."

.....

How much does localization cost? "It is not an inexpensive process," says Baron. "It may easily cost \$20-30-40,000 to localize a product. It could cost more, it could cost less depending on the product. Let's suppose you have a 30-minute video of the jungle, and you have a little bit of narration in the beginning and end, and maybe a total of five minutes of narration pointing out the things that one sees on the screen, and it needs to be localized into a foreign language. At this point, the text needs to


be transcribed, translated, and checked, you need to book a studio, hire voice talent, spend a day at the studio, and then put it back without any regard for the timing because it's behind scenes. You don't see anyone saying anything onscreen; the narrator is not onscreen. Something like this would take three, four, five days, and cost \$1,000, maybe \$1,500.

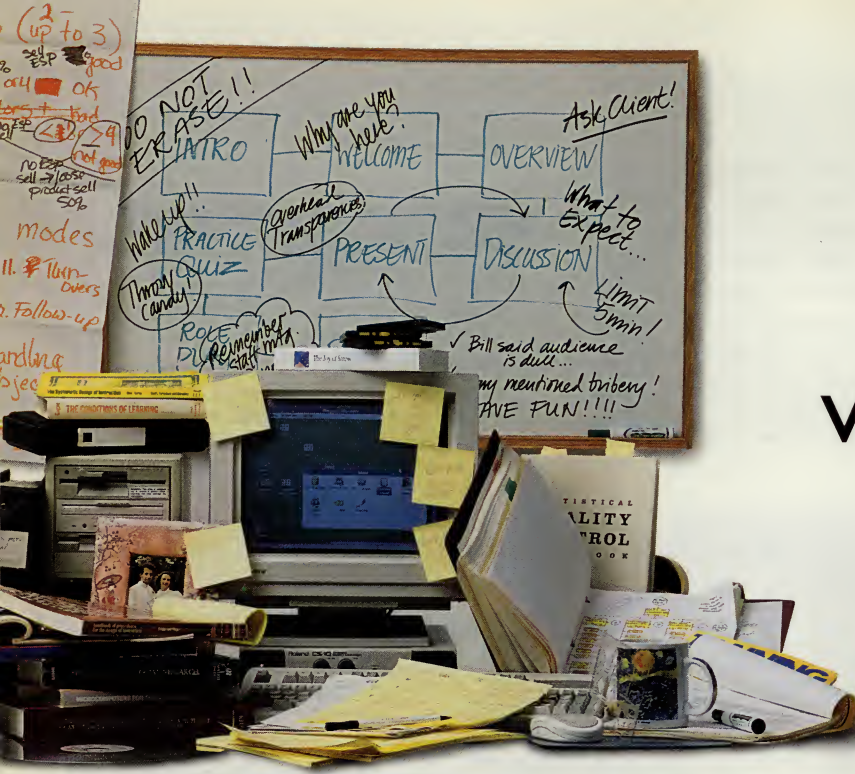
"Or maybe you have a 30-minute interactive product," he continues, "where you push buttons to learn about a lion or a panther, and you have experts onscreen in a little window who talk about the animal. You can dissect it, look at the muscles, and so on. This means you have to adapt the onscreen buttons, some sound effects have to be re-created because they coincide with the text, and that could be a very involved process that could take a couple of months." And it could end up costing "tens of thousands of dollars. Of course, nobody's going to spend this money unless they are confident about the product being successful — selling enough copies to the target customer to justify it and hopefully making a profit."

Colamonico is quick to point out, "The time and the cost are greatly effected by *when* the client comes to us in the process. Developing a product in a localizable way tends to cut down on time and money in the long run because things are more structured from the beginning."

Currently, Polyglot employs 45 full-time staffers and an army of freelancers. "The number of translators varies according to the workload," says Colamonico. "We have a certain number of permanent translation staff, but most of our translators work on a contract basis, so at various times we have any number of translators working on projects. It's project-specific hiring in that sense."

There are plenty of translation companies on the planet, but Polyglot sees itself as a one-of-a-kind company. "In terms of expertise," says Baron, "specifically in multimedia and interactive software, I don't think we have much competition, if any."

If you'd like to learn more about the hows and whats of Polyglot, they can be reached at 340 Brannan St., 5th Fl., San Francisco, CA 94104; vox 415.512.8800; fax 415.512.8982; email polyinfo@polyglotint.com; <http://www.polyglotint.com/polyinfo>. 

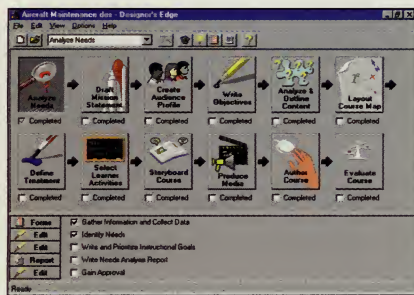


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How Digital Planet Used Netscape's Dynamic Documents Function to Deliver Animation on the World Wide Web

THERE'S A GOOD REASON WORLD WIDE WEB CLIENTS

like Mosaic are called "browsers." While interactive in the sense that you can choose where to go, the Web is still essentially a translation of print, and Web pages are largely as static as the pages of a magazine on a rack. You can click on hyperlinks or fill out forms to your heart's content, but all you'll get in return are more pages, and they'll be the same pages no matter how many times you hit the RELOAD button.

So it would seem to make little sense that the Marketing Entertainment Group of America (MEGA), a New York firm, turned to the Web to promote *Burn:Cycle*. Originally published in CD-I format by Philips Media Games and recently ported to CD-ROM, *Burn:Cycle* (which takes its name from a virus contracted by its 21st-century antihero) is among the least static computer games ever developed. Tense, episodic, tightly clocked, and intricately plotted, it immerses players in an evolving, film-like world in which they become agents, not watching or reading but reacting and deciding.

No traditional medium — print least of all — is really capable of conveying the flavor of this game, which bills itself as an experience and an adventure. Where radio airplay more than suffices to experience a recording — in fact reproducing its experience exactly — only playing a game is faithful to the game experience. And while film trailers give you a fair sense (however compressed) of what you'll get from a movie, a trailer for an interactive CD-ROM would lack the interactivity.

And since *Burn:Cycle* is immersive and evolving, depending for its effect on increasing engagement with futuristic characters, locales, and situations, uploading a sample level to the Net would fail as well. The only solution for MEGA, whom Philips tapped to publicize the relaunch, would seem to have been the costly and ultimately preposterous tactic of producing a fully enabled CD-ROM demo of the CD-ROM.

MEGA knew that it would have to push the limits of traditional marketing to promote *Burn:Cycle*. One result was what company founder and president Danny Socolof calls "the first CD-ROM lifestyle spot," a television ad (placed on MTV, Comedy Central, and *The X-Files*) graphically depicting the game's effects on a fictitious player. But Socolof also decided that if *Burn:Cycle* were to become the pop-culture event Philips hoped for, some new medium would have to be found or created to sample it.

Enter Digital Planet, a Los Angeles Web development firm whose clients include Universal Pictures and MCA. Philips and MEGA guessed the Web was ideal at least demographically. Though nobody has yet produced convincing evidence, it was a good bet that the target market of 18- to 34-year-old males is well-represented on the Net. Besides, as Socolof says, "People who are on the Web obviously have computers, are more likely to have CD-ROM players, and are more likely to favor the computer as an entertainment medium." So the market was potentially there. The trick would be pushing the technology to get the *Burn:Cycle* experience across.

WARNING! BURN:CYCLE DETECTED

If Web pages are static, the Web itself is far from it. Anyone who remembers the days before the first Netscape beta can tell you that as limiting and clunky as the Web may seem now, we've already come a long way. Much more is already in the pipeline in the form of inline applications, virtual reality modeling, and high-level control over page design. (Everybody's talking about Java, VRML, and Acrobat.) And as more people connect via 28.8kbps modems, ISDN, or cable, such developments — still alpha, beta, or vapor — will become more practical. The limits of the Web are an open challenge to the development community, which is rushing to meet it.

But virtual reality still isn't here. Nor will the nascent Virtual Reality Modeling Language (VRML), which adds 3D graphics to hypertext,

provide a solution anytime soon to problems like those faced by the *Burn:Cycle* team. Besides, the product launch was scheduled for September 1995, and the tools on hand would have to do.

Those accustomed to the usual look and feel of Web pages may be surprised when they arrive at <http://www.burncycle.com>, *Burn:Cycle*'s official Web-site-cum-promo. Navigating directly to the index page gets you the standard result: a static page with the game logo and the familiar disclaimer that Netscape Navigator is the recommended client. (We'll see why in a moment.) But if you've got Netscape and you choose the FULL GRAPHICAL EXPERIENCE, cool things start to happen. ("Cool," the Web's official term of approbation, permeates *Burn:Cycle* PR.)

As soon as you jump off the index page you land in the middle of what looks (and almost feels) like a video (Fig. 1). WARNING: BURN:CYCLE DETECTED flashes black on red, then white on black; the sign is quickly replaced by the *Burn:Cycle* logo, a threatening white on red



Figure 1. Pre-homepage graphics

danger icon. The text BURN CYCLE in white scrolls across a black field, flashing red again in the center, only to be replaced once more by the logo, which proceeds to go supernova.

This is just the beginning. Burncycle.com makes unprecedented and extremely clever use of the *dynamic documents* capability first introduced by Netscape in the beta versions of Navigator 1.1. (Unfortunately, no other browser can yet handle the *Burn:Cycle* experience, though similar capabilities may become more universal once the latest HTML specification is finalized and integrated. Evaluation copies of the most recent Navigator are available on the Net at <http://home.mcom.com/comprod/mirror/or> <ftp://ftp.netscape.com/netscape/>.)

Though their implementation has so far been largely frivolous, dynamic documents are a fairly significant development in Web design because they allow a simple but potentially effective form of animation. In brief, dynamic documents are Web pages capable of updating themselves. Either the whole page or just one portion (such as an image) can be updated or replaced, and within limits you can control the pace at which the server loads new data. Intelligently done, with an eye toward the constraints on bandwidth and processing capacity, the results can be impressive. Burncycle.com is certainly the most impressive dynamic site to date.

The simplest sort of dynamic document relies on just one new HTML tag, namely <META>, part of the forthcoming HTML 3.0 specification. <META> is principally intended for contents, such as keywords, which describe a document but aren't part of its viewable content. Thus <META> supplements existing tags such as <TITLE>, <!DOCTYPE> (for *document type*, such as HTML 2.0 or SGML), and <BASE HREF> (which sets a common referent for all URLs in a file).

But <META> — and this is the cool part — can also simulate HTTP commands, instructions ordinarily sent by a server to the client (browser). Using <META>, you can embed such commands in a document, effectively enabling the client to behave as though the server sent them. This means that some HTTP instructions, albeit a small subset, are *portable*, i.e., resident in the Web document and independent of any particular server.

The most common use of <META> in dynamic documents is a technique known as *client pull*, based on the metaphor of a browser pulling down new data from the server. Here's an example:

```
<!DOCTYPE html public "-//W30//DTD W3 HTML 2.0//EN">

<HTML>

<HEAD>
<TITLE>Client Pull Example</TITLE>
<META HTTP-EQUIV="Refresh" CONTENT="10">
<BASE HREF="http://www.machine.com/">
</HEAD>

<BODY>

This page will reload every 10 seconds.

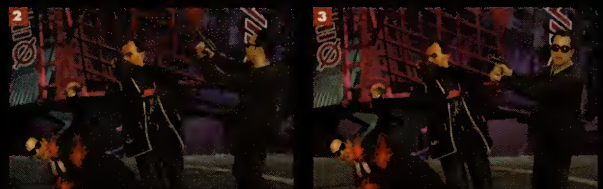
</BODY>

</HTML>
```

Here, <META> is used to simulate the HTTP command REFRESH. Refresh means replace, and in this case we've instructed the server (in the CONTENT tag) to replace the document every 10 seconds. By default the server will just push down the same page as is, unless a script has



I had only a moment to act, and in that moment my life changed forever. I made a decision. I crossed the line...



I had only a moment to act, and in that moment my life changed forever. I made a decision. I crossed the line...



I had only a moment to act, and in that moment my life changed forever. I made a decision. I crossed the line...

Figure 2a. In what the site's developers refer to as the "Quentin Tarrantino" sequence, a large image is broken into three smaller JPEGs, each of which is separately refreshed to enhance the viewer's sense of continuous action.

altered it in the meantime (between pulls). We could just as easily construct the tag to refresh the current page with a completely new one. For example:

```
<META HTTP-EQUIV="Refresh"
CONTENT="10;URL=http://www.machine.com/new-
page.html">
```

In this case, the URL of the replacing page (new-page.html) is appended to the CONTENT definition. (For a good example of client pull, visit "the place" at <http://gertrude.art.uiuc.edu/ludgate/the/place.html>.)

PUSHING CONTENT

Much more interesting and flexible than client pull is a technique dubbed *server push*, which is the principal enabler of *Burn:Cycle*'s effects. Unlike client pull, server push depends (as you might guess) on the server, which is called on to execute Common Gateway Interface (CGI) scripts. Such scripts may be written in any number of languages, typically



Figure 2b: The Burn:Cycle homepage breaks a large imagemap down into four quadrants, each of which is separately refreshed to produce effects such as lighting marquees and changing billboards. The composite results can be seen in Fig. 2c on p. 53. (The second table in this HTML script is not illustrated.)

HTML assembling these four quadrants:

```
<HTML>

<HEAD>
<title>BURN:CYCLE</title>
</HEAD>

<BODY bgcolor="#000000" text="#ffffff" link="#ff0066" vlink="#eeee00" alink="#fc1ace">

<center>

<table border=0 cellspacing=0 cellpadding=0 width=500>

<tr align=right>
    <td align=right><a href="http://trailer/a.html">
        </A></td>
    <td align=left><a href="http://maps/billboardb.map">
        </A></td>
</tr>

<tr align=right>
    <td align=right><a href="http://maps/undergroundb.map">
        </A></td>
    <td align=left><a href="http://maps/new.map">
        </A></td>
</tr>

</table><P>

<BR>

<table border=0 cellspacing=5 cellpadding=0 width=450>

<tr>
    <td ALIGN=left><FONT SIZE=4><B>Burn:Cycle Episode 6</B></FONT></td>
    <td ALIGN=right><FONT SIZE=4><B>Episode 7 Online September 15th</B></FONT></td>
</tr>

</table><P>

</center>

</body>
</HTML>
```

Note that the images are placed in a 2x2 table and that each cell is linked to a different server push CGI script (home.picgroup for quadrant one, billboard.picgroup for quadrant 2, etc.). Three of the quadrants are imagemapped (as you can see from the ISMAP attribute).

Perl or C. The important thing is that the scripts be placed in a directory configured for scripts. In this case, it helps to run your own server. Most Internet providers don't allow users to write their own CGI because scripts pose security risks.

A server push script instructs the server to continually push new content through an open connection to the client. This content may

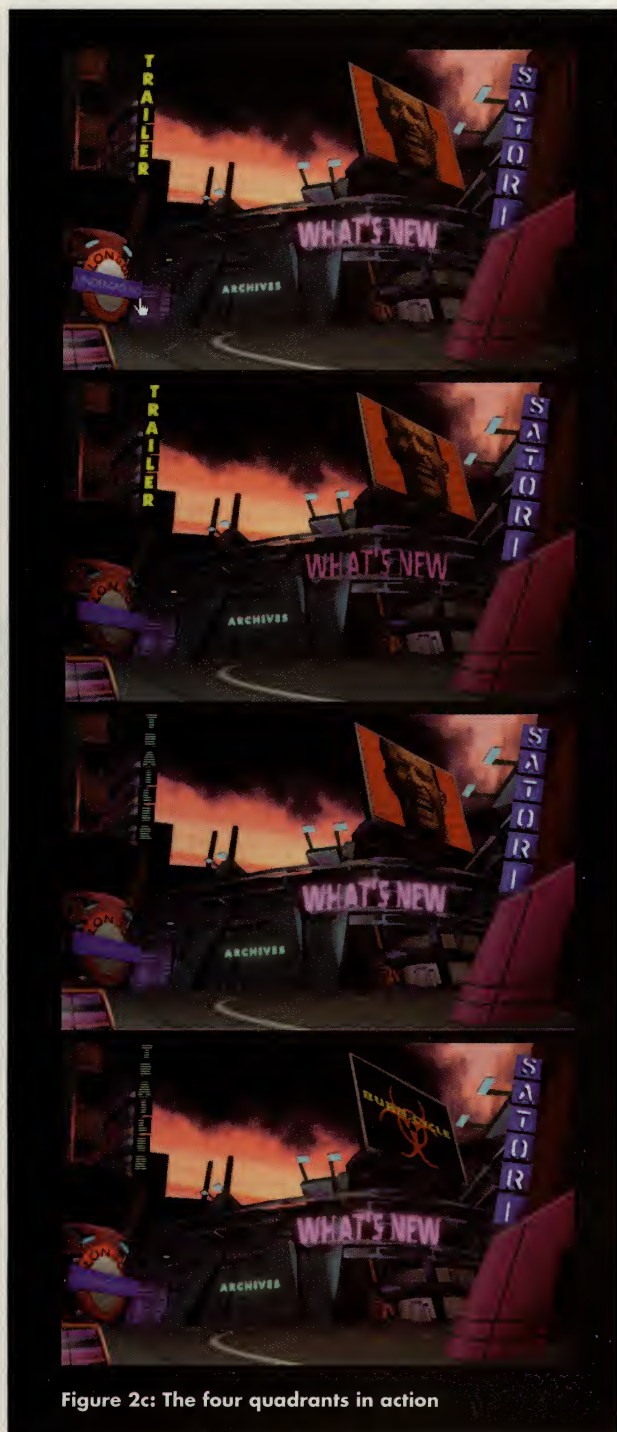


Figure 2c: The four quadrants in action

be raw data, HTML, even sound or images, as long as its type is recognized by both server and client. Recognizable data types are defined by Multipurpose Internet Mail Extensions, or MIME. (See "How to Put Together an Internet Web Site: An HTML Primer," *InterActivity*, May/June 1995.) MIME types include, among many others, *text/html* for Web documents, *audio/basic* for sound in the Sun audio format, and *image/gif* for images encoded in CompuServe's proprietary Graphics Interchange Format, the lingua franca of Web graphics.

By far the most popular use of server push on the Net is to dynamically update one inline graphic on a Web page without reloading the rest of the content. When Netscape introduced server push to the Web, they also produced the first sample of single image refreshing (see http://home.netscape.com/assist/net_sites/mozilla/), which frankly was rather lame. Better were sites such as Razorfish (<http://www.razorfish.com/>) and the famous Amazing Fish Cam (<http://www.netscape.com/fishcam/fishcam.html>), which constantly updates its picture of an aquarium with realtime photos.

Regardless of how well it's done, server push is triggered the same way: by giving a script as the content of the `` HTML tag. Ordinarily `` points at an image (it's an abbreviation of *image source*, after all). For example, to place a graphic on a Web page, you would construct a tag like this:

```
<IMG SRC="http://www.machine.com/images/picture.GIF">
```

This tells the browser to fetch the image "picture.GIF" from the directory "images" on the machine "www.machine.com" and then to display it inline.

To push a series of images, however, you first need to write a CGI script to send them in sequence. Call the script "imagepush.pl" ("pl" stands for Perl). Then copy the script into an executable directory, which on most servers is called "cgi-bin" by default. Finally, insert the URL for the script in the `` tag where the image URL would normally go:

```
<IMG SRC="http://www.machine.com/cgi-bin/imagepush.pl">
```

The tag is the easy part. Writing the script is much harder, though I've provided a simple example in the "Scripting Server Push" sidebar.

CONTINUOUS LIVE ACTION

Digital Planet makes heavy use of server push to achieve burncycle.com's impressive animation effects. Some techniques, such as fading in and out by pushing a sequence of images, are familiar from sites like Razorfish. Others, however, are used for the first time on this site.

One new technique involves breaking large images into smaller pieces, and then pushing each piece separately at different times (see Fig. 2b). This method offers several technical and psychological advantages. For one, it's a more effective way of simulating continuous live action; the eye is drawn to different parts of the image at different times, which produces a greater sense of following events than if the eye were focused uniformly. And since only a small portion of the image needs to be refreshed, everything happens faster, which also enhances the effect of continuity.

Here, as on most of burncycle.com's pages, speed is the foremost technical challenge. If the animation is too slow the effect is destroyed, and the typical Web surfer's impatience is legendary. In fact, the big problem with serving dynamic content on the Web, as Digital Planet's Thomas Lakeman points out, is the "constant interruption as new pages are requested and sent, which breaks up the user's experience." And

burncycle.com

since the whole point of the site is to simulate the experience of the game, such interruptions are potentially fatal.

Breaking large images into independently refreshed pieces solves some of the bandwidth problem; sending them in JPEG format rather than GIF helps too. (JPEG compression is much more efficient, though slightly more lossy.) But pushing images, even JPEGs, and running CGI

episodes. Not only does each episode call for making new, more complex decisions; each draws the player further into the action as an agent. (At one point the player even gets to off a couple of goons [Fig. 2a].) Web surfers thus get a chance to immerse themselves in the situations and *Burn:Cycle* milieu without spoiling the surprise of the game.

Standard HTML tricks suffice for much of this sort of interactivity — clicking on one character's name takes you to a new page, which in turn branches in various directions — though many of these routines were enhanced specifically for *Burn:Cycle*. For example, at one point players are required to solve a puzzle by clicking a sequence of digits in the correct order. Rather than having each click send players to a new page, which would require hundreds of pages to handle all the permutations, the original page simply calls a script to record all the clicks together. This requires only two links to display the results: success or failure.

Another clever routine delivers clues by email in return for filling out a simple HTML form. This provides Digital Planet and ultimately Philips with useful addresses and provides players with a sort of reality-bending experience when they receive mail from one of the game's characters. In this and other ways (such as incorporating the game's developers, Trip Media, into the game) Digital Planet exploits the growth of the Net to blur reality and virtuality.

They're not alone in this. The enormously popular site The Spot (<http://www.thespot.com/>), a daily online twentysomething soap opera composed of diary entries and snapshots, also exploits the constantly eroding distinction between life online and off. But Digital Planet's Lake-man draws a contrast between the *Burn:Cycle* site and The Spot. "The whole direction everybody's taking on the Web right now is toward original content," he says. "But our site tries to pull you into a world in which you have choices. So you exist there, as opposed to being a voyeur, which is the other way you can go with interactive."

If the access data and email response are any indication, the *Burn:Cycle* Web site has succeeded in pulling in more people than anyone had hoped. The true test, of course, will come when actual sales figures begin



"Trailer" image being refreshed through server push.

scripts puts a significant load on a server, and at times of peak access pushing can begin to feel like straining. Besides, while Digital Planet can control some of the server load through judicious use of server push and imagemaps (clickable graphics with hypertext hot-spots), they can't control the speed of the accessing modem, the drag of general network load, or the client's processor.

So while animation is essential to delivering activity, Digital Planet eschews animation for its own sake, relying mostly on other, less time- and server-dependent ways of delivering interactivity. Most important, the *Burn:Cycle* team came up with several ways of making the Web site play like a real game. Constructed as a nine-week prequel to the CD-ROM, the experience of burncycle.com is broken into weekly levels or

OTHER COOL SITES USING SERVER PUSH

Razorfish

<http://www.razorfish.com/>

The Sci-Fi Channel's Dominion

<http://www.scifi.com/dominionpr.html>

webology group

<http://www.webology.com/www/index.html>

Batman Forever

<http://www.batmanforever.com/>

The Amazing Fish Cam

<http://www.netscape.com/fishcam/fishcam.html>



rolling in. Philips, which hopes to finally make a dent in the CD-ROM market, will be watching closely. So too will the many marketing directors still skeptical of the Web's commercial potential, though the lesson learned may not be entirely clear. No one has proven you can sell a product on the Web, but perhaps burncycle.com will prove that you can sell a cool experience, and cool experiences sell product.

Michael Macrone designs Web pages and maintains a site at <http://www.well.com/user/macrone/>. He has also written numerous books on literature and the history of ideas.

To construct a CGI script for server push (using the Perl language in our example), you first need to make sure the server will send the appropriate Content-type MIME header. In this case, the MIME type is *multipart/x-mixed-replace*, an experimental type developed by Netscape specifically for this application. You then need to define an arbitrary boundary string to separate the different pieces that will be pushed sequentially. Here, we'll use *chunk* as the boundary string.

Let's say the pieces to be pushed are four images of a waving hand, sequenced to simulate animation. (For the push to work, all images must be exactly the same size in pixels.) They are all in GIF format, they all live in the directory "images" at www.machine.com, and their names are "hand1.GIF," "hand2.GIF," "hand3.GIF," and "hand4.GIF." The script itself lives in the directory "cgi-bin" on the same machine.

```
#!/usr/local/bin/perl

print "HTTP/1.0 200"
    #header currently required to run server push scripts.

print "Content-type: multipart/x-mixed-replace;boundary=chunk\n\n";
    #this prints the proper header and defines the boundary string.
    #note that no space is allowed after the first semicolon.

print "--chunk\n";
    #first boundary; the double-dash is required.

print "Content-type: image/gif\n\n";
    #outputs the proper content type for the first piece, a GIF image.

print "cat ../images/hand1.GIF";
    #changes directories to fetch and output the image data.

print "--chunk\n";
    #new boundary; delimits the second piece.

print "Content-type: image/gif\n\n";
print "cat ../images/hand2.GIF";
print "--chunk\n";
    #outputs the second image with appropriate header and delimiter.

    #and now the rest of the script:

print "Content-type: image/gif\n\n";
print "cat ../images/hand3.GIF";
print "--chunk\n";
print "Content-type: image/gif\n\n";
print "cat ../images/hand4.GIF";
print "--chunk--\n"
    #a trailing double-dash signifies "end of data."
```

This is a fairly unsophisticated script, which could as easily be written in C or shell. (In the shell version, "echo" would substitute for "print.") With a little extra programming you can control the pace of the refresh, construct loops, and otherwise produce more elegant results.

For a fuller introduction to server push, consult Netscape's documentation at http://home.netscape.com/assist/net_sites/dynamic_docs.html. A good site for more information on dynamic documents is Malcolm's Resource Guide to Netscape's Server Push, Client Pull, and CGI Animation (<http://www.emf.net/~mal/animint.html>).



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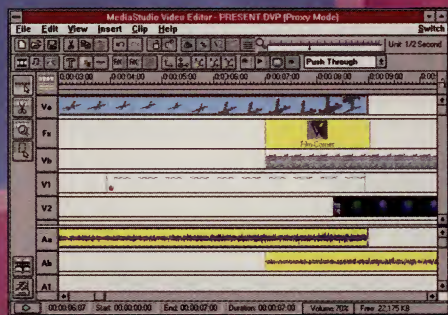


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ON THE TRAIL OF THE INTERACTIVE GRAIL

A ROAD MAP FOR WOULD-BE SCRIPT WRITERS

Whether you're a seasoned Hollywood screenwriter, novelist, or one of the many aspirants to those lofty towers, chances are you've been bitten by the interactive bug. You see your future in the credits of mass-market CD-ROMs and downloaded programming on demand. Or perhaps in the opening window of a new online service, offering anything from games to ethnic cooking lessons.

Whichever bug has gotten to you, you'd have to be in cryogenic suspension or suffering from a severe neurological disorder not to be aware that nearly everyone with a computer or a game platform has interactivity — the magic word — on their lips these days. You've heard that it represents the future of entertainment and education, and you want to stake your claim before the gold rush. Why else would you be reading a magazine called *InterActivity*?

The marriage of Hollywood and Silicon Valley has yet to bear offspring capable of capturing the imaginations and disposable incomes of the new generation of consumers with the "killer app" in multimedia. Fortunately, there does indeed appear to be a future in writing for interactive media. But it's not what you might expect.

Today's most successful interactive products are still encyclopedias and bang-bang games. Not much opportunity there to lure you from your day job. What about interactive movies? We regret to inform you that they're a myth. A movie, like theater, is storytelling. Regardless of the point of view, a movie is a screenwriter's story told through action and dialogue in a linear sequence that the author intended.

Multiple branches and endings, cute gimmicks that they are, rarely enhance a story, and are poor excuses for interactivity. Screenwriters entering the interactive arena beware this booby trap: it's not just a movie with buttons.

The top six reasons why interactive movies have floundered:

6. Filmmaking is a highly refined art form requiring specialized technology. The average American secretly longs to be Kato Kaelin. 'Nuff said?
5. 900-page scripts.
4. *Hell Cab! Hell Cab!*

3. You're the project's protagonist . . . and you can't talk!

2. In Silicon Valley, they think you can produce an hour of video for \$200,000. Can you say "student film"?

And (drum roll) the Number One reason interactive movies don't work: *If the script sucks, a trained scriptwriter wrote it.*

So-called "interactive movies" have been blurry, blotchy, jerky, mucho expensive, semi-interactive boondoggles answering questions that nobody asked: Movies ain't broke — so don't fix 'em. Game consumers, especially the 16-and-older crowd, have become extremely gun-shy of the whole Hollywood/full-motion video thing. To them it means a lousy game with limited control and repetitious video clips.

Okay, you knew this tragic scenario couldn't end like this; you're a writer. Where's the third act? Well, it's not finished yet. That's your job. Here's how it begins:

EXT. AMERICA — SUNRISE

► PCs and game consoles are finally starting to deliver reasonable quality graphics, animation, video, and audio. This means the player can actually read subtle character expressions and understand what they mean. Until now, technical deficiencies have been a huge impediment to effective storytelling, forcing writers to create simplistic, over-the-top, cartoonish situations, characters, and dialog.

► Even better, the inevitable convergence of broadband cable and the Net will create a huge market. Forget point-and-click interactive TV. This is totally post-linear stuff: a realtime immersive multiplayer environment with staggering possibilities. Get with the program . . . or should we say, the anti-program.

► No, interactive movies still don't work. But who cares? This non-linear stuff does work, in its own goofy kind of way. More on that later.

In practice, this Holy Grail has turned out to be more of a Trojan horse. The quest for interactive fiction gets you in the door of a potentially lucrative new market, but once you're there, you look around and realize, "My God, I'm trapped in Geekworld, what are they gonna do with me?" The answer is, they're going to try to turn you into one of them. It's not as bad as it sounds, but almost.

So you got the gig and cashed your advance check. That was your first



BY ROBERT GELMAN AND KENNETH MELVILLE

ON THE TRAIL OF THE INTERACTIVE GRAIL

mistake. Now they throw you in a room with somebody called the Game Designer. This person is your natural enemy. He or she will seem friendly at first, but don't be deceived. They'll be drinking your blood before the lunch break.

Here's the problem: They've created a game called . . . let's call it *Sword Shark* — a fencing game based on *The Three Musketeers*. It's played from the first person point of view of D'Artagnan. You say, "Excellent. I will give D'Artagnan an opening soliloquy worthy of Dumas." Your designer says, "Forget it. He can't talk. He's us. We could be a woman. We could be a child. That would break the suspension of disbelief. Besides, how would we select what to say? Put *text buttons* on the screen?" He laughs gaily and breaks into the derisive sneer common to the Interface Police.

He informs you that any one of the Three Musketeers standing before your character may be selected. "What if you click on Portos?" he asks. You are inspired and gush forth: "Portos will reveal his character in a clever skit mocking Cardinal Richelieu. . . ." "Stop!" cries the designer. He then whips out a flow chart the size of a bed sheet and stabs his index finger at a little box in the upper left hand corner. "Says here, 'Portos fights us.'"

You appear dazed. The designer shows you two little boxes connected to the first one. One says WIN and the other LOSE. "I need dialog for these," he states flatly. You are re-inspired. You take the WIN box. Let's see . . . uh . . . The vanquished Portos is lying in a cart of mule dung as his companions make merry at his expense. Portos says something like, "Your swordsmanship, sir, is a match for Cardinal Richelieu himself! My companions and I . . ." The Designer leaps to his feet. "No, no, no. That's too long for the player to go without making another decision. Besides, Richelieu is the boss of level 26. He's not in this part."

He presses on, relentlessly. "I was thinking of three possible lines from Portos appropriate to our degree of skill: 1) You're pretty good, D'Artagnan; 2) You're awfully good, D'Artagnan; and 3) D'Artagnan, you're no slouch with that weenie roaster." Your mind wanders to the ominous stack of unpaid bills behind your toaster . . . you manage to choke out, "Gee, that really, really works for me. This is so exciting."

By now you have correctly deduced that the interactive writer is below krill in the Game Company food chain. Things could be worse. They could be out of plankton burgers at the company cafeteria.

You can see here the heart of the problem is the dreaded "E" word. Exposition. The designer is right, of course. The game design requires that every word out of your characters' mouths advance not the plot — for all practical purposes there *is* no plot in the traditional sense — but advance The Game. Players are mainly interested in succeeding in the game and therefore want to hear *useful stuff* all the time. Stuff that relates directly to their progress. For the most part, dialog that expresses character depth and motivation requires a pace and verbosity that players find, frankly, frustrating. They want clues. They want path choices. They want information. They'll

stomach a little punchy payoff jargon if it's kept to humorous or arch one-liners, but even that can get tedious after the fiftieth play of the game.

Exposition. In the gaming world, it's mostly all you'll be asked for. It crowds out nuance, humor, repartee, emotion, development. And since players want to get right at whatever the game is about (shooting, exploring, fighting, etc.), it effectively crowds out character. It's very difficult to introduce a non-stock character if there's no screen time to allow them to reveal or explain themselves. You'll be left with a very confusing, half-baked persona. That's why there's so many stereotypes in games and the interactive genre.

It is generally assumed that players care more about the unique qualities and surprising variations within gameplay than they do about the necessary evil of the characters that populate the world. Also, the simpler and more obvious the backstory, the less non-interactive screen time needs to be devoted to it. Game designers get very nervous if more than a few seconds go by without a required action from the player. And as for plot, players essentially create the plot themselves as they proceed down the success path of the game.

Even worse for the hapless writer, the occasional great line of dialog or clever bit of business they slip into the product repeatedly hammers at the player like water torture with each replay. That had better be some killer non-expositional dialog. That's why players routinely blow by all the dramatic scenes after the first play of the game. Once is enough.

So in this guerrilla war between traditional writing virtues and gaming requirements, the designer is the *Doom* guy with a chainsaw and your script is an Entertainment Software Review Board-approved red stain on the floor . . . if . . . and only if . . . you try to hang on to your musty old Writer's Bible. Well, snap out of it! Welcome to the sewers, punk! Relax. Pretend it's a game. Maybe it'll even be fun.

Some tips for surviving the post-Hollywood apocalypse:

1. **Forget drama.** You're writing hyper-drama. Minimalism is supreme. Every first-time interactive writer overwrites, big time. It's almost impossible to underwrite for the medium. There's no time to set up gags. There's no time for your character to enter, exit, cross the room, nothing. Things happen, NOW. Short, declarative lines will work. And they'd better be good. One of the few saving graces of the medium is what we like to call *The Rocky Horror Picture Show* Syndrome. If your lines are catchy and classic enough, instead of players blowing through all your work on the hundredth play, they'll actually sit through it and chant the dialog along with your character in a mindless nirvana of gaming bliss. It's a lot more work for you, but it pays off.
2. **Always put yourself in the player's chair.** What do you want from this world? If you really think about it, you actually *do* want a story, you *do* want surprises and plot twists and fascinating characters. Storytelling is still important, it just needs to proceed from the player's actions and explorations. Not from a rigid, pre-digested, linear, writer-as-god mindset.
3. **Make players earn plot surprises and character payoffs through their own cleverness and hard work.** If you can make that happen, you're thinking like a game designer, and the dynamics of your script and those of the design will begin to merge and reinforce one another. And your designer will give you a big kiss.

Okay, let's look at this as a business for a minute. Is there work out there for you? The answer is "probably." And those are a lot better odds than you'll find in the TV and film industries.

Two main forces are at play right now: New hardware is coming to market with radically improved program quality — PlayStation, Saturn, M2, DVD, MPC3 for PCs, and eventually settop boxes bringing in massive amounts of interactive data and entertainment.

The slightly downbeat side of this for us writers is that these systems can generate extremely realistic, high-speed, polygon-based computer graphics. This gives the consumer a highly immersive and engaging arcade-style world in which video and its attendant story and characters are largely irrelevant. Some of the biggest game companies are growing skeptical of the need for

ABOUT THE AUTHORS

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any full-motion video at all. This is not quite as disastrous as it sounds because the highly articulated animated characters, humanoid or not, that can be generated by these platforms will still need a good writer behind the curtain to bring them to life.

Right now is the best time to try to break into the industry. That's because the individuals at interactive companies who hire writers are still relatively open to unsolicited scripts. They'll still read unrepresented relative unknowns. Why? For the most part, Hollywood agents haven't schmoozed, wined, dined, and generally mesmerized them yet. These creative directors, producers, and product development people are usually not products of the TV and film industries and haven't got a Rolodex full of agents to whom they owe favors. In short, they're low-flying stealth targets for the ICM and CAA crowd.

But this is changing. Agencies have had their consciousness raised concerning the interactive world. Some of this came about when they noticed that a number of their film and video director clients were being well paid for interactive productions that were quick shoots and a great fit between series or features. This created a relationship with the interactive company and before you knew it, scripts began arriving by the boxload at Big Game Company Inc. The only upside of this is a big one for you, the starving writer: Established writers demanded and got bigger bucks than those who came before them. They also negotiated ironclad contracts that are becoming the norm, to everyone's benefit.

Interactive media is still a relatively wild and woolly industry compared to the elaborate set of standards and practices in Hollywood. The Writer's Guild has yet to wrestle with the murky overlap that can occur between designing and writing an interactive product.

Here's some plain advice on that: First, get yourself representation in the form of a licensed agent or entertainment attorney who can prepare and negotiate an equitable contract. You'll be glad you did. Second, be sure to review responsibilities and terms relative to the creative tasks as they evolve, and be sure you're comfortable with the compensation. And third, you can expect a certain amount of creative give and take between yourself, the designer, the director, and others on the creative team. Don't expect any design credit unless you've contributed in a major way to the final design. A good designer really pumps to deliver that final design spec, so give them a break. Conversely, be extremely protective of your writing credit! It should be understood that design elements that affect plot and character are just that: design elements.

And what does the future look like?

The gamer has a VR helmet, an SGI-quality graphics chip, and a high-speed hookup into a multiplayer Net service. So what's in it for the writer? Not much except an entire world to create. Sure, if the designer wants to give players guns and make them run around shooting at everybody, you can take a hike. But what if there are no guns? What if there are non-player characters (NPCs) rendered in 3D who can talk? What if they're complete with personalities, weaknesses, needs, jokes, whatever? Artificial intelligence sufficient to generate fully realized, realistically spontaneous people isn't really that far off if you define your characters to take very simplistic actions and have very simple responses.

What does this brave new virtual world look like? What can you gain and lose out there? What are the central conflicts that drive this place? This is creative territory as well suited to a writer as a game designer. What are the dramatic possibilities when an onscreen player surrogate, or Avatar, meets and engages another? Is there dialog? Action? Barter? Out of the primordial ooze of lifeless graphics explodes an endless self-generating society, and you get to design the Genesis Bomb that blasts it into being.

In the nuts and bolts department, make sure you're using a late-model word processor or scripting software that can output and import a variety of standard formats like Word RTF. Get a fast modem, hook into an online service so you can email your clients easily. A fax machine will save your butt, too. You wouldn't believe how many writers are using junk like Wordstar on 12-year-old machines incapable of connectivity. This provides a lot of headaches for the producer as none of the files are compatible in either di-

GETTING UP TO SPEED

You may have noticed that there's no shortage of professional information for the aspiring interactive writer. In fact the problem may be one of sifting through the stacks of promotional literature on books, magazines, CDs, and professional conferences that offer some potential new insights into this field. Two of the better places to turn for information and interaction with your peers: The Writer's Connection, an organization that publishes a newsletter and holds events such as the "Writing for Interactive Media" conference held in Santa Clara, California in mid-'95; and the upcoming American Film Institute symposium on "Storytelling for the New Millennium."

The latter is being held April 22-28, 1996 on the island of Kauai and will include some of the leading thinkers in the entertainment field. It's specifically aimed at artists interested in immersing themselves in filmmaking, new media, graphics, music and sound design, and publishing on the Internet. It will include hands-on workshops from April 22-24 (including one on interactive audio by *InterActivity's* own Chris Meyer) and conference sessions April 25-28.

Nonlinear storytelling will be covered by Dana Atchley, Marty Behrens, director of interactive features at Sony, Peter Bergman of Firesign Theater fame, Michael Nash and Rebekah Behrendt of Inscape, photographer/developer Rick Smolan, and Rocket Scientist Michael Backes.

Registration is \$695; \$595 if you sign up before Feb. 15, 1996. For more info call 800.999.4234; 213.856.7690; fax 213.467.4578; <http://afionline.org>.

For more info on the Writer's Connection, contact them at Box 24770, San Jose, CA 95154; vox 408.445.3600; fax 408.445.3609; email writerscxn@aol.com.



rection and you can't email anything. We even knew a guy who wrote *by hand*. That stuff is all very charming, but interactive scripts are complicated and rewrites are endless because of frequent design changes.

A couple of notes on script formatting: Try using standard screenplay format with scene numbers keyed to the design flow chart. Include a lot of game design description, including interface and graphics utilization at appropriate places within the script. This helps the production folks understand the gaming context and motivation of the dramatic action, and gives them a better sense of the final screen presentation and dynamics of the product. Be sure to center and italicize that material so the production manager and the director don't associate it with anything they have to budget or shoot.

Finally, go play and experience interactive games and edutainment products of the genre you'll be writing in. When producers and project managers meet with a writer for the first time, it helps to know the writer's opinions about a specific product's gameplay, interface, graphics, stories, and characters. It's just human nature. If a writer shows no interest in interactivity, there's concern that they're not going to get it or get into it. An ace writer who's ambivalent about interactivity is usually useless to a project. Many crash and burn before the first draft. We'd much rather have a less experienced writer who's really excited by the boundless and sometimes bizarre possibilities of the medium. Such people are likely to have the sustained interest and energy to take them through the wringer of the development process. And if they knock out a great script that not only conforms to, but enhances and expands the designer's vision, that would be cool, too. That's the real Holy Grail of interactive writing.



BLAST FROM THE PAST

PASSPORT'S ALCHEMY 3.0 AUDIO PROCESSOR FOR THE MAC

B Y C H R I S M E Y E R

Mixing multitrack audio is a feature of popular video editing programs such as Adobe Premiere and the primary function of digital audio workstations from a variety of manufacturers. But before it was common to record, mix, and play multiple tracks of audio within the digital domain, some programs were dedicated to detailed editing and processing of

comes to massaging audio clips for multimedia and desktop video projects. A fine example of the breed is Alchemy (\$495). Originally developed several years ago by Blank Software, it was the only real alternative to Digidesign's venerable Sound Designer program, the original sample editor. Passport purchased the rights to Alchemy in 1989 and eventually discontinued it for lack of sales. But

history, Alchemy has proven to be as vital for audio production as Adobe Photoshop is for manipulating still images. Let's take a tour of the program, stopping occasionally to look at some of the things it does best.

Audio Scalpel

Alchemy's user interface is simple and effective (see Fig. 1). The resizable windows to the right display the sound files currently loaded. The number of sound files that can be open at once is limited only by the amount of RAM you've allocated to program. (Unlike many other audio programs, Alchemy does not spool data to and from the hard disk—one of the reasons it's better suited to editing individual sounds than entire soundtracks.) The toolbar along the left gives you quick access to basic editing functions; the parameter box beneath the tool icons displays the current location of the cursor and selected area in the file with single-sample accuracy. You can select the units of time and level you want to see in this box plus several other display options, such as whether a horizontal line marks the 0dB level. The basic Alchemy operation is to select an audio waveform (or a portion thereof) and use either the toolbar or the menus to alter it.

The OPEN and SAVE dialogs alone are worth the price of admission to some users (Figs. 2a and 2b). They provide a wealth of information about stored sound files as well as the ability to translate among various file formats and to rename and delete files without opening them or going to the Finder. Sound files may be stereo or mono and opened from and saved to a number of formats, including 8-bit and 16-bit variations on AIFF and .WAV, Sound Designer I and II, the less common Dyaxis and original SoundEdit formats, and Apple SND resources.

In addition, Alchemy includes a simple recording utility for digitizing sounds directly into the program. Sounds can be played through the Mac's onboard sound chip, various Digidesign audio cards, or any Sound Manager 3.0-compliant sound card. A good sound card is handy because it enables you to hear the sounds you're working on at full fidelity—no need to export them to a sampler or other playback device.

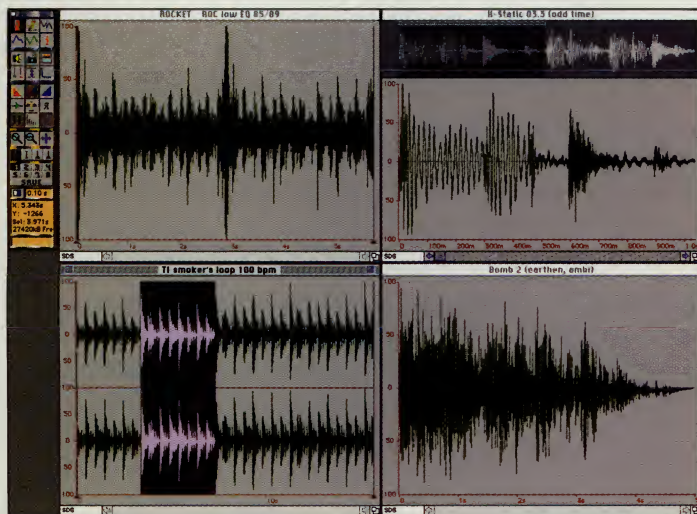


Figure 1. Alchemy's main display, with sound files on the right and a tool-and-information bar along the left.

individual sound files. These applications were developed to massage audio snippets for playback on sampling-based musical instruments.

Fortunately, they're also useful when it

audio specialists wouldn't let such a useful piece of software die, and in early 1995 Passport spruced it up and released version 3.0.

Over this long and somewhat serpentine

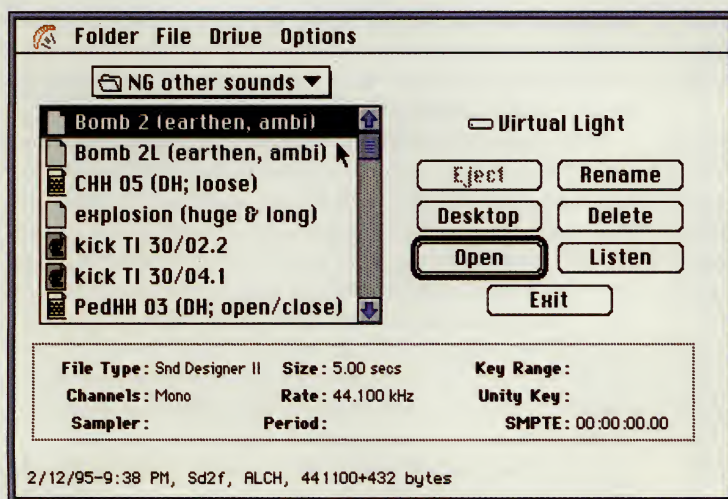


Figure 2a. The Open Special dialog. Note the optional file management buttons as well as the file information along the bottom.

I have yet to find the upper limit of the sample rates Alchemy supports. Furthermore, the sample-rate conversion function is one of the best I've heard. A lot of my sound effects come from old sampling instrument libraries and Internet gopher sites, with odd sample rates such as 8kHz, 27.472kHz, and 31.250kHz rather than the usual 48kHz, 44.1kHz, 22.254kHz, and 22.05kHz. Not all multimedia programs deal gracefully with this situation, but Alchemy enables me to convert each one to a friendly rate.

You can merge stereo files into mono, split mono files into stereo, and quickly normalize levels for optimal signal-to-noise ratio. Alchemy also makes it easy to mess around with a sound file's header information without changing the sound data itself. The uses for this are arcane, but it can get you out of some sticky situations such as the one described in the "Pull-down Tricks" sidebar below.

If nothing else, it's a good idea to run your sounds through Alchemy to normalize them, resample them at a consistent rate, and save them in a consistent file format before mixing in a program such as Adobe Premiere. But Alchemy can do much, much more.

Cut, Copy, and Paste

If Adobe Premiere is your premier audio editing tool, then you're accustomed to working with timing resolution of a single video frame. However, one frame — 33.3 milliseconds at 30 frames per second (fps) — can be an eternity in audio. Vital attack transients at the very start of a sound can be as short as 2 to 15 milliseconds.

A little-known feature of Premiere makes it possible to edit a file's start point down to 1/600th of a second (select the CLIP WINDOW OPTIONS menu item) — less than two milliseconds — but flaws in a sound can be as short as one sample point, and as many as 80 of them fit into that time at the highest typical sample rate, 48kHz. Also, Premiere makes changes in audio level only at frame boundaries, which is a bit coarse for smooth fades.

The first thing you'll notice about dedicated sample editing programs such as Alchemy is their ability to zoom in to the level of individual sample points (see Figs. 3a - c). At this level you can trim start and end points precisely by cutting out the unwanted sections. Alchemy enables you to do a lot of corrective surgery as well, such as fade selected regions up or down.

For instance, you might need to edit a voiceover so it starts with the second word actually spoken; unfortunately, this gives it an unnaturally abrupt attack. In this case, you'd locate the first word by looking for transitional

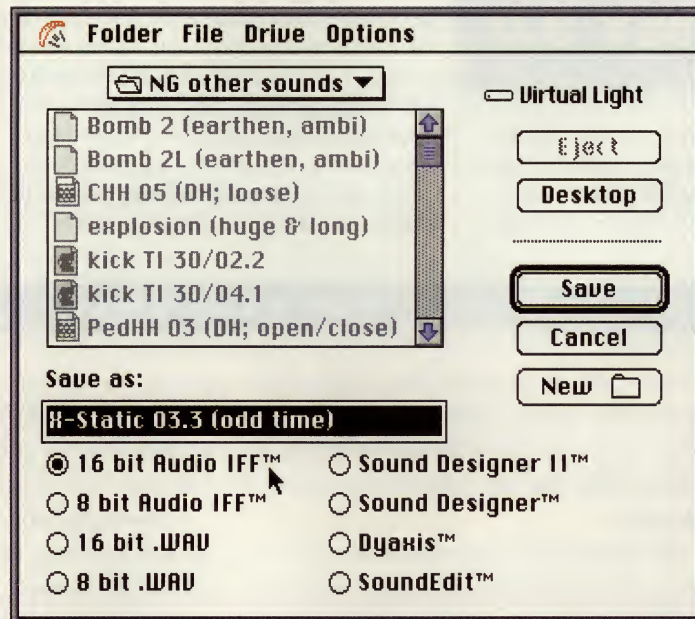


Figure 2b. The Save As dialog, offering an assortment of file formats. (SND resources are dealt with via a separate menu item.)

places in the waveform — you can select an area and hear it by pressing the space bar, so it's easy to find precisely the portion you want to cut out — and, after cutting, fade in the first

several waveform cycles of the second word to fake a more natural start. This operation is illustrated in Figs. 4a - c. (Tip: For fade-ins, I prefer the 6dB slope setting in the EDITING OP-

PULLDOWN TRICKS WITH PREMIERE & ALCHEMY

Many think of NTSC video as operating at 30 frames per second (fps). In reality, it runs at 29.97fps. Slowing audio to match this slower speed is sometimes referred to as *pulldown*. Dealing with these differences in speed often requires some trickery.

For example, if you've built a project in Adobe Premiere 4.0.1 at 29.97fps, created all your audio elements at 44.1kHz, and set the audio output rate to 44.1kHz, you might notice that the resulting audio track is slightly longer than its original length and that it also sounds a little distorted. This appears to be due to Premiere's insistence on treating audio source files as though they were created at 44.056kHz. (An update of Premiere was in beta test as this issue went to press. However, Adobe has not confirmed that this problem is fixed in the new version.)

Why 44.056kHz? This sample rate is slower than 44.1kHz by the same percentage (0.001%) that 29.97 is slower than 30. Thus, Premiere reads 44.1kHz files as though they were 0.001% longer. The degradation in audio quality results from the low quality sample-rate conversion that Premiere performs to bring this "44.056kHz" file up to the 44.1kHz output rate you've specified.

But all is not lost — Alchemy provides a workaround. First, go ahead and set Premiere's audio output rate to 44.056kHz. Then export your soundtrack as an audio-only movie at this rate. This eliminates Premiere's sample-rate conversion (and the audio distortion it creates), but the file will still play back slightly long. To fix this, we'll use Alchemy to tell a little white lie.

Take your audio-only movie and re-export it as an AIFF audio file (also at 44.056kHz to avoid the sample-rate conversion once again). Open this file in Alchemy, select GET INFO, and change the sample rate in this dialog from 44056 to 44100. Since you haven't altered the number of samples in the file itself — which is the information Premiere uses to calculate the file's duration — this faster rate will reduce the duration of the sound. Save it, import it back into Premiere, and you will find it plays at the correct rate and sounds like it ought to.

ALCHEMY 3.0

TIONS dialog. For fade-outs, I use the 3dB slope option and apply the fade twice. The "Not Fade Away" sidebar below explains why.)

Of course you can cut, copy, or clear regions

anywhere in a sound file. If you hear a pop or click in the middle of a sound, you can select only the waveform cycle in which it appears and simply cut it out. If an unwanted sound appears during an otherwise silent moment, but you need to preserve the length of the file, select the offending sound and clear it. If there's a sound that you detest but need to live

with, such as an overly sibilant spoken "s," select it and reduce its level.

(Another tip: You may notice that most of the regions in the accompanying illustrations begin and end at points where the audio waveform crosses the horizontal line that indicates 0 volts, known as *zero crossing* points. There are a couple of reasons for this. One, at this

NOT FADE AWAY

Neophyte animators often use the default linear motion. As we get more experienced, we learn the wonders of ease-ins and -outs for more natural or appropriate motion. The same goes for audio fades. Although the default is often linear, sound often sounds more natural with a different fade shape.

Fig. S1 shows a default linear fade-up and -down. However, natural sounds tend to begin and end in an exponential curve, as shown in Fig. S2. Notice that the two fades are not symmetrical around their center point in time — the fade-down is an inversion of the fade-up. Not all programs mimic nature in this way when you select an exponential fade.

For example, Fig. S3 shows a fade-up and -down performed in Alchemy using their 6dB fade option. The fade-up curve is a fair approximation of an exponential fade, but the fade-down is not what I would prefer. Like many audio programs, Alchemy's fade algorithm borrows fade curves used when panning a signal from left to right. If you were to turn the

pan control on a mixer from left to right, the first half of Fig. S3 illustrates what the right channel would do and the second half what the left channel would do. This is appropriate for panning, but it's not the way sounds fade up or down in nature.

Conversely, Fig. S4 shows a fade-up and -down performed in Premiere using the LOGARITHMIC fade option. Here, the fade-down mimics nature, but the fade-up doesn't. This is because in logarithmic mode, Premiere recalculates volume points along the fade curve based on decibel units rather than percentages of the overall level. This is great for setting volumes that don't change, but not for fades.

When fading sound files in Alchemy, I tend to use the 6dB curve for fade-ups and the *linear* 3dB curve for fade-downs. You can get closer to an exponential curve by applying the 3dB curve twice in a row. This gives you a curve based on squares (you didn't think you'd have to take a math lesson to read a software review, did you?), which is close to exponential. The end result is shown in Fig. S5.

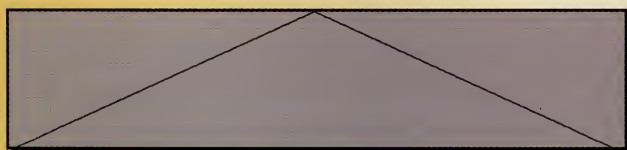


Figure S1. An exponential fade as it might occur in nature.

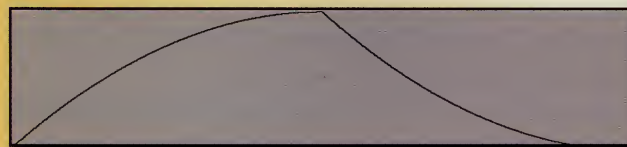


Figure S2. A linear fade as provided by most audio processing applications.

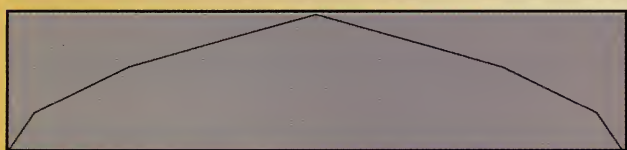


Figure S3. Alchemy's 6dB fade curves.

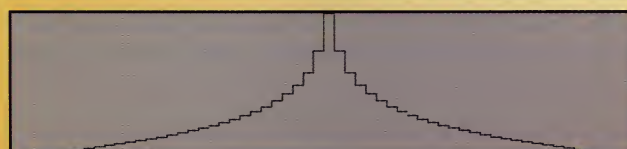


Figure S4. Premiere's logarithmic fade curves. Premiere updates the volume level only once in every video frame, creating the coarse steps evident here.

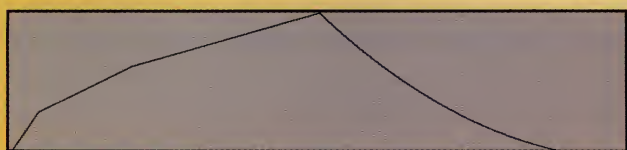


Figure S5. In Alchemy, you can approximate an exponential fade by applying the linear 3dB curve twice.

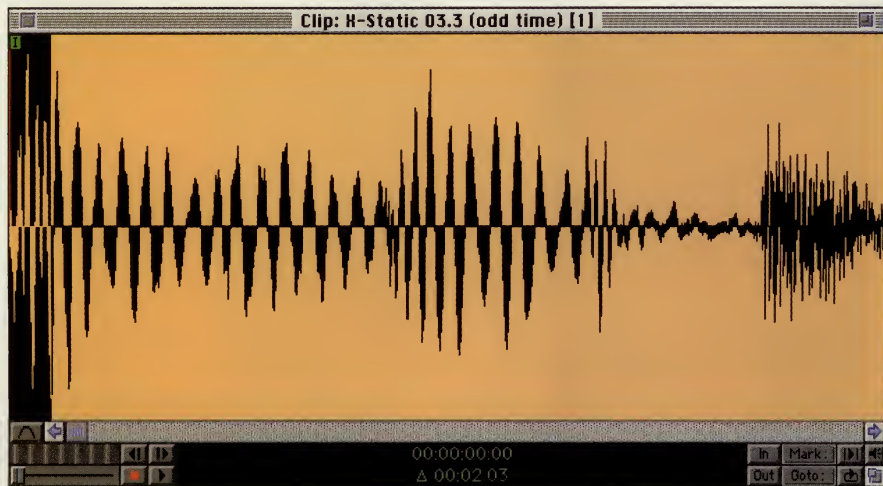


Figure 3a

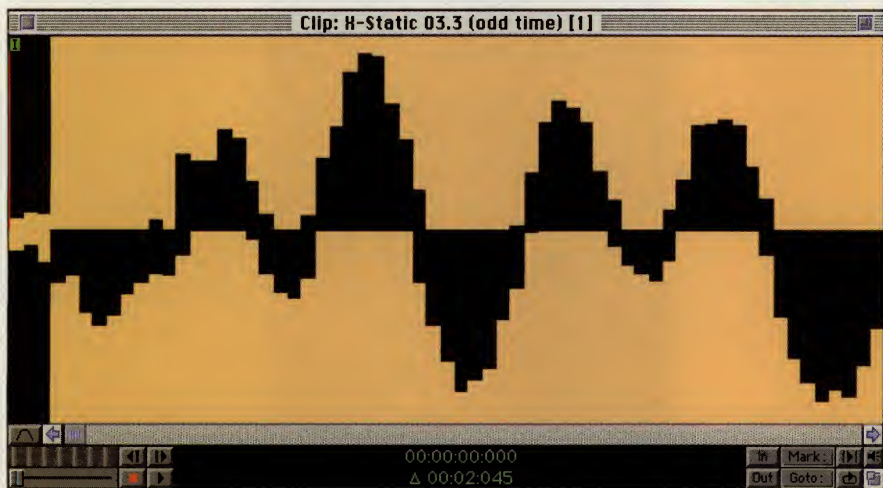


Figure 3b

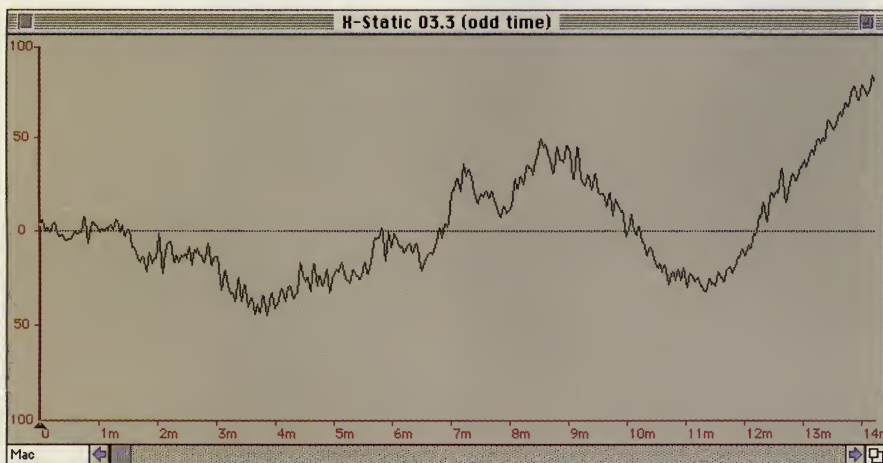


Figure 3c

Figure 3. Zooming in to the start of a sound file using Premiere and Alchemy. Premiere is accurate to one video frame (3a) or 1/600 second (3b). Alchemy is accurate to a single sample point (3c).

ALCHEMY 3.0

Description

Editing and processing application for individual audio files.

System Requirements

Virtually any Macintosh running System 6.x or higher. 600kB on hard disk, minimum 2MB RAM. Optional Digidesign or Sound Manager 3.0-compliant sound card enables instant auditioning of sounds at full fidelity.

Features

Cut, copy, paste, insert, trim, fade, invert, reverse, scale, normalize, sample-rate conversion, audio file format conversion, stereo/mono conversion, equalization, time scale, pitch shift, echo, frequency and amplitude enveloping, resynthesis, crossfade looping.

File Support

Mono and stereo as well as 8- and 16-bit AIFF and .WAV, Sound Designer I and II, Dyaxis, SoundEdit, Apple SND resources.

Suggested Retail Price:

\$495.

Contact

Passport, 100 Stone Pine Rd., Half Moon Bay, CA 94019; vox 415.726.3826; fax 415.726.2254. Reader Service #200

point the speakers reproducing the audio are in their "at rest" position, providing a handy place to make an edit. Two, any instantaneous jump in the waveform from one level to another results in a small pop in the audio; editing only at zero crossings ensures that this doesn't happen. Alchemy does have a BLEND option that automatically crossfades across edit points to reduce accidental pops, but I prefer to edit carefully to begin with.)

Fold, Spindle, and Mutilate

I am a believer in synchronizing audio and video events — timing beats in the music to

ALCHEMY 3.0

cuts in the video and so forth. Often this can be accomplished simply by editing appropriately. But sometimes the length of an audio clip must be adjusted to match that of the video (or vice-versa). Programs such as Premiere are capable of changing the playback speed of both audio and video clips, but doing this to audio produces a nasty side effect: the pitch changes as well. That is, if you slow down an audio clip to make it longer, the pitch becomes lower automatically. This is not always acceptable.

Consequently, one of Alchemy's most useful features is TIME SCALE, the ability to change the duration of a sound without changing its pitch. As you can see in Fig. 5, you can set the ratio between the old and new length or type in the desired length directly. (Version 3.0 has a mild bug in this area: If you tab to the DURATION field and try to change the value, Alchemy ignores you. If you select the field by double clicking, it will accept a new value.)

The sound quality of Alchemy's time scaling is above average — virtually every manufacturer's duration-change algorithm breaks down beyond a 10% change or so — but more important, Alchemy enables you to adjust duration to within one millisecond. Many other programs get only within 10 to 100 milliseconds, which isn't precise enough for video applications. Combined with the ability to display time units in SMPTE format, this is a powerful tool for locking in audio-to-video timing.

Alchemy can create the usual effect of changing duration and pitch in tandem, but the result is specified in musical units — with a *great* deal of precision, by the way — rather than duration (see Fig. 6). However, there's an option for changing pitch without affecting

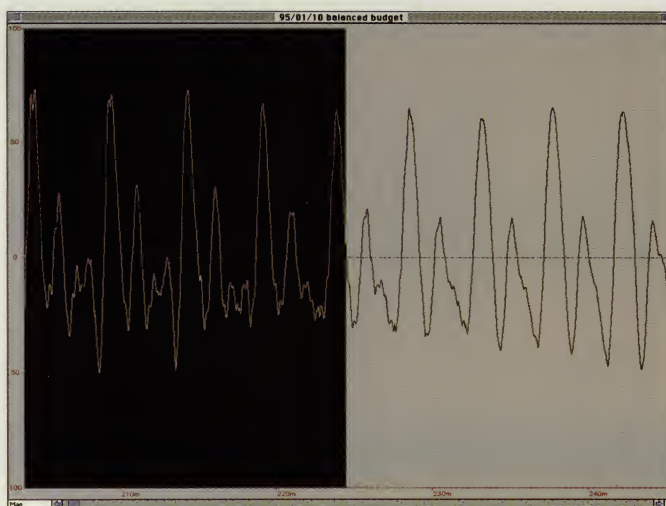


Figure 4a

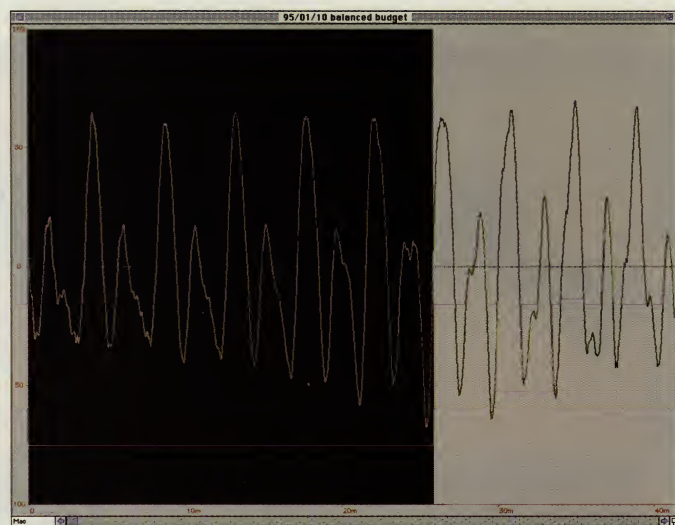


Figure 4b

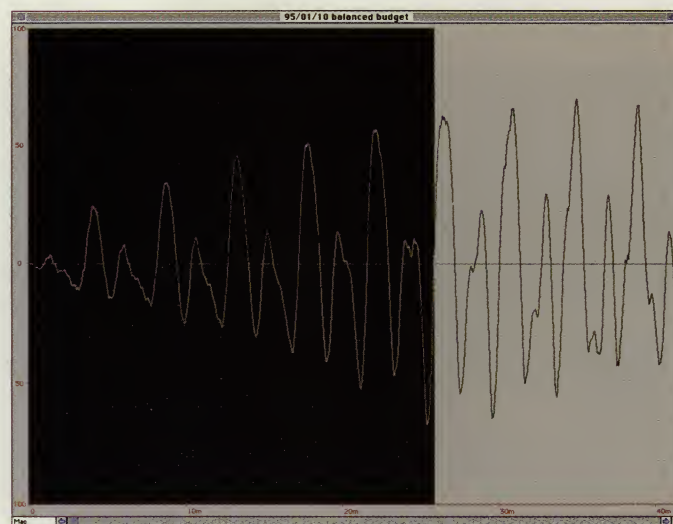


Figure 4c

PROS AND CONS

Pros

High sound quality, extremely precise control, easy to use.

Cons

Size of sound files you can work with limited by RAM; awkward copy protection.

The Bottom Line

A top-notch tool for editing and processing individual audio clips.

Figure 4. Editing the start of a sentence. Select the first word by looking for a transition in the waveform's shape (4a). Cut, then select the first few waveform cycles of the second word (4b). Fade up the start of the second word for a more natural sounding start (4c).

duration. Aside from being great for sound effects work, I use this to lower the pitch of a voiceover slightly to increase its apparent gravity without changing the timing.

In addition to changing the pitch of an entire sound file (or a selected region), you can change pitch over time by drawing a pitch envelope over the waveform display (see Fig. 7). I use this to change the inflection of sentences, transforming, say, a question into a statement by applying a downward bend to the last word. This process sounds slightly grainy compared with Alchemy's other pitch-shift facilities, but it's useful nonetheless. You can also draw a volume envelope and either fade a clip up and down by the amount drawn or force the level to match it exactly. The latter is useful for sound design work.

Speaking of sound design, Alchemy has several other features geared toward creating sound effects and musical samples rather than multimedia audio. These include the ability to loop, reverse, invert, echo, and even perform resynthesis. Of more immediate usefulness is a simple equalizer.

In general, Alchemy's signal processing algorithms sound excellent. Not all audio DSP algorithms are created equal, and most of Alchemy's are either transparent or sound musical.

Reassemble

Alchemy is an essential part of my multimedia toolkit. It may not be obvious that you need an additional application when you have Premiere to mix multiple tracks and Sound Designer to record and edit individual clips. But Alchemy's range of editing and processing tools, the precision with which you can apply them, and the sound quality of the DSP functions make it indispensable for getting that extra 10% out of your audio clips — and occasionally for spinning aural straw into gold.

The version 3.0 update makes the program more stable, supports more file types, and adds the ability to record new files directly in the program. Most important, though, is that it reintroduces a powerful "secret weapon" for getting the most out of multimedia soundtracks.

Chris Meyer is an audiohead who has also taken to modulating video for Los Angeles-based CyberMotion. Chris is also manager of technical research at Roland Audio Development and teaches digital audio at the Hollywood branch of the American Film Institute.

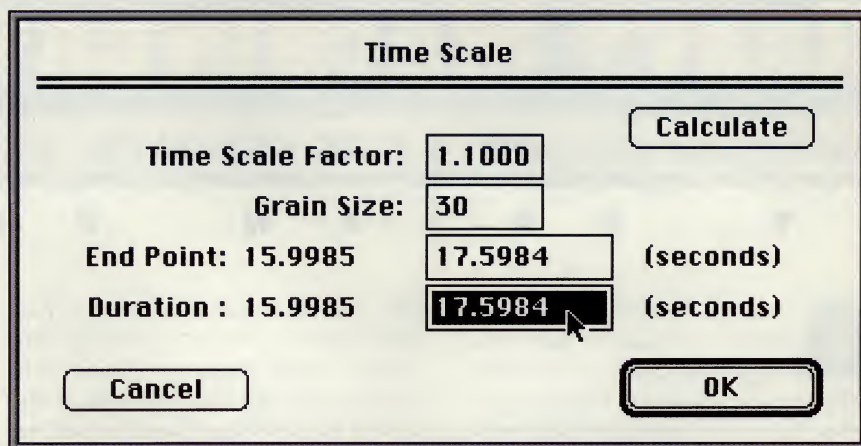


Figure 5. The Time Change dialog.

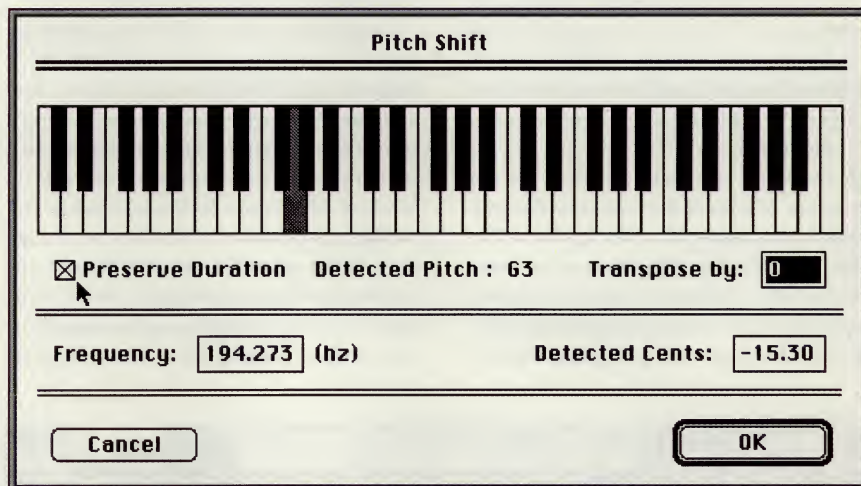


Figure 6. The Pitch Change dialog. Note the check box at the lower left to preserve duration.

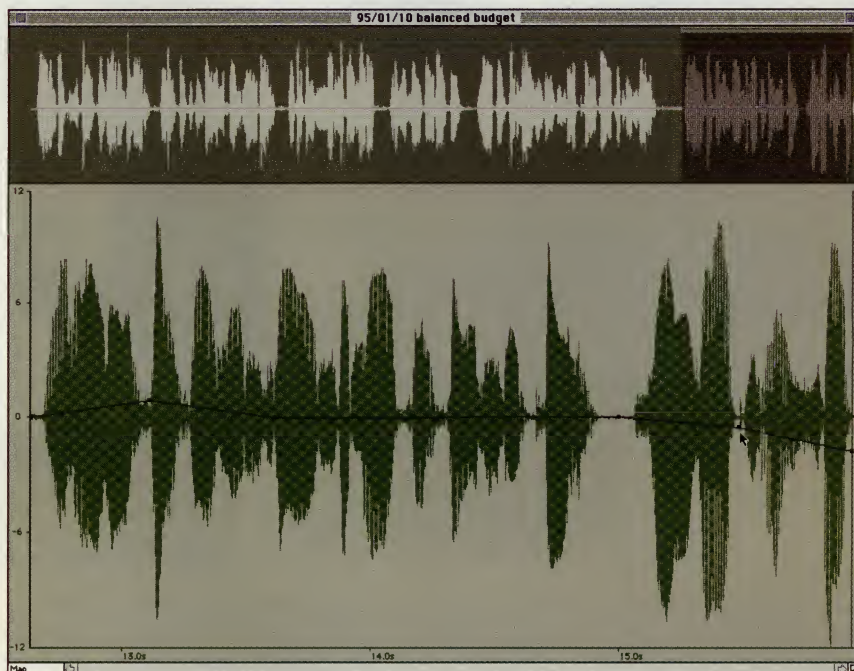


Figure 7. Drawing a pitch envelope over a sound file.

HEAVY MACHINERY FOR CBT

MULTIMEDIA TOOLBOOK 3.0 CBT EDITION FOR WINDOWS FROM ASYMETRIX

B Y B R I A N P R O F F I T

Asymetrix' ToolBook authoring system for Windows has been around for many years. As soundcards and fast processors became widespread, Asymetrix introduced Multimedia ToolBook, adding the ability to incorporate audio, video, and animation into ToolBook applications. The latest version, Multimedia ToolBook CBT Edition, is a superset that contains all of Multimedia ToolBook 3.0 plus additional authoring and runtime functions designed specifically for computer-based training (CBT).

A ToolBook application is built on the metaphor of a book that contains discrete pages. In this respect ToolBook is more like Claris HyperCard or Quest from Allen Communication — although it lacks the latter's graphic overview — than to Macromedia's Director and Authorware, in which events are

defined along a timeline. Referring to ToolBook projects as "books" is somewhat misleading, though, as several windows can be open at once in the manner of a typical Windows or Macintosh application. But until you become familiar with the complexities of the system, it lends itself most readily to creating applications in a single window.

Multimedia ToolBook CBT is an extremely capable authoring system and, at \$1,295, a surprisingly affordable one. It is also a formidable challenge to developers, offering a sprawl of features and capabilities within a fairly opaque organizational framework. Much of what it can do lies well below the surface, as I continued to discover things throughout the review process. Anyone authoring for Windows would do well to consider both its strengths and weaknesses. (Asymetrix reports that they have been test-

ing the current version extensively under Windows 95 with performance comparable to or better than that obtained under Windows 3.1.)

ToolBook, Multimedia ToolBook, and CBT Edition are currently marketed as varying levels of the same product. Indeed, CBT Edition retains vestiges of having been built in layers and is best understood by examining them individually. The bedrock stratum is what we'll call the ToolBook base.

Authoring Bedrock

The basic ToolBook file is a *book*, of which several can make up a complete application. Each screen in a book is considered a *page*, which is presented through a *viewer*, essentially an intelligent window. Pages contain various *objects* that can be combined into *groups* for easier manipulation en masse. Each object on a page resides in its own *layer*. Layer numbers are assigned automatically based on the order in which you create objects, but you can also enter them manually in the OBJECT PROPERTIES dialog. (This is handy when you want to set the order in which users tab through various fields and buttons; tab order follows layer numbers.) The *background* portion of a page holds objects common to a number of pages, such as a background bitmap, title text, and navigation buttons; any number of backgrounds can be included in a single book. Additional objects — buttons, graphics, text, and other media — can be incorporated to customize individual pages. The authoring environment is WYSIWYG, perhaps overly so. Objects placed on a page appear as they will to users, but some events, such as path animations, aren't directly represented in authoring view.

ToolBook provides menus and a toolbar, which are largely redundant, at the top of the main window (see Fig. 1). The toolbar can be grabbed and detached to function as a palette, joining a variety of floating tool palettes (TOOL, LINE, LINE ENDS, PATTERN, COLOR, and POLYGON) and helpful windows such as the PROPERTY BROWSER (starting with Multimedia ToolBook), which provides detailed information about individual objects, and the UNIT CONVERSIONS calculator (CBT Edition

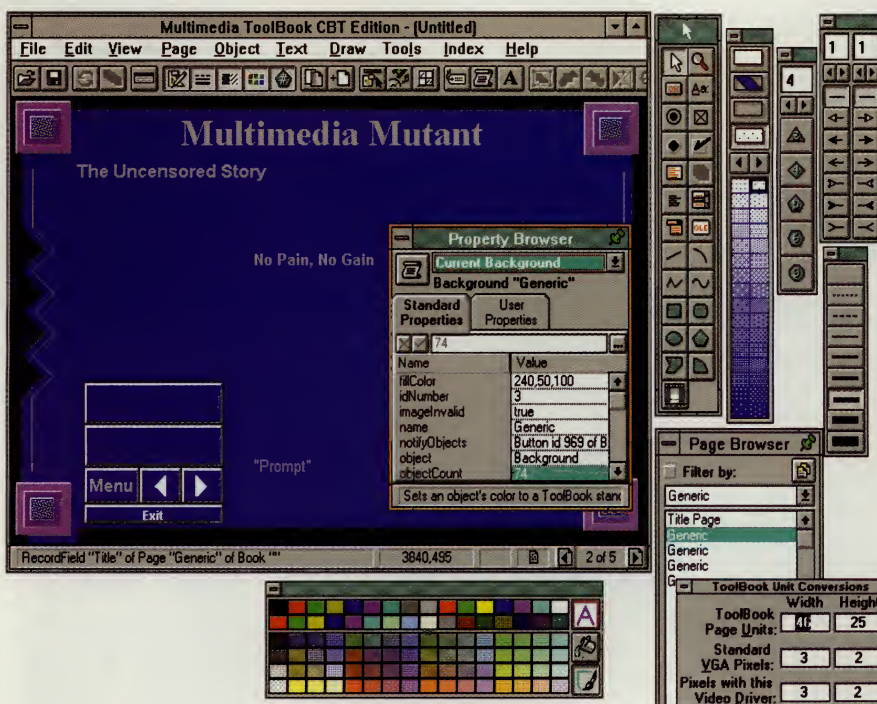


Figure 1. ToolBook provides menus and a toolbar at the top of the main window, which are largely redundant. A status bar along the bottom displays the name of whatever object, or function of any tool, the cursor is pointing at as well as the cursor's current position. A variety of floating tool palettes and helpful windows makes creating many kinds of objects as simple as pointing, clicking, and drawing.

only), helpful for specifying pixel sizes and locations within scripts. Highlights include the ability to present a mix of font sizes, styles, and colors within a text field, and to draw arbitrary curves and regular polygons with any number of sides. A variety of fill patterns is available, but I was surprised not to find gradient among them.

ToolBook makes good use of the right-hand mouse button. It calls a pop-up menu with its own abbreviated toolbar and a list of editing options appropriate to the object you've clicked upon.

All of which makes for a lot of redundancy in the interface; there may be a few quite different procedures for accomplishing exactly the same result. Whether you find this confusing or helpful probably depends on how familiar you are with the system, but by and large these facilities enable you to do a great deal of authoring simply by pointing, clicking, and drawing.

A status bar runs along the bottom of the main window. It displays the cursor's current position and, helpfully, the name of whatever object — or the function of whatever tool — the cursor currently is pointing at. The status bar also provides buttons for navigating among the pages of the current book. Page names are important when writing scripts to branch from one page to another, so the name of the current page appears as well. Unfortunately, this information isn't updated when you change pages — you actually have to point at something on the new page to make its name appear. Thus, if you're using the navigation buttons to move from page to page and you want to see their names as you go, you must move the pointer onto each page for the status information to update appropriately. (An excellent alternative, new to CBT Edition, is to select PAGE BROWSER from the VIEW MENU. The Page Browser lists pages by name, organized according to their background. To go to a page, simply double-click on its name.)

As you can see, the development tools take up a lot of screen space. You'll want to work with a larger display than you expect users to have so you can keep the tools onscreen without obscuring too much of the book you're building. You can customize the screen somewhat by dragging the edges of the Tool palette or the detached toolbar to reshape them, stacking the icons horizontally or vertically, with a single row or a single column at either extreme (see Fig. 2). By pressing F3, you can toggle from author mode to reader mode to hide the development tools and see the book as it will appear to users. This makes debugging much easier, particularly when

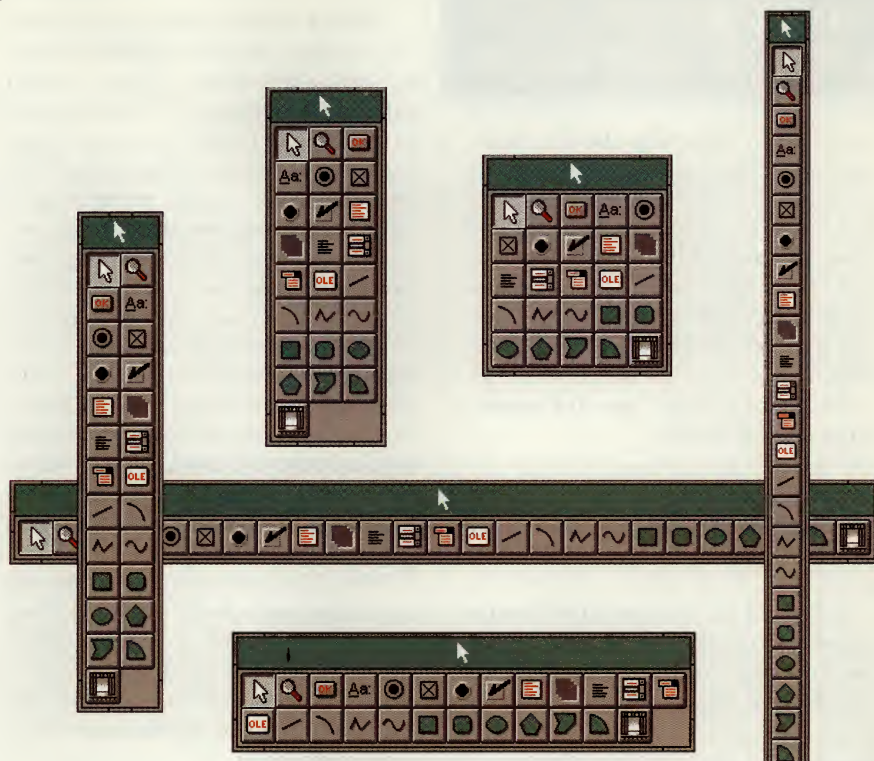


Figure 2. By dragging the edges of the Tool palette or the detached toolbar, you can reshape them and stack the icons horizontally or vertically in a variety of configurations.

you get into dynamic effects such as animations and dissolves between pages.

In addition to the application itself, the ToolBook base includes a variety of external utility programs including the PalEdit palette editor, BitEdit bitmap editor, Cursor/Icon Editor, and Menu Editor. These are bare-bones utilities, but handy. When a project is complete, the SAVE routine optimizes it for CD-ROM; MEDIA PACKAGER (in the TOOLS menu) adjusts the directory paths of media elements to accommodate any user's hardware; and the Setup Manager utility creates installation diskettes for distribution, gathering and compressing the necessary runtime modules, books, and media elements. Definitely not to be overlooked are the Samples Library (available in the Windows Program Manager or by selecting APPLICATIONS from the TOOLS menu) and Reference Library (in the Windows Program Manager), books that contain a wealth of less-than-obvious information about what ToolBook can do and how to do it. Nice collections of clip art and background bitmaps also are provided.

Objects, Widgets, & Dynamics

Graphics are true objects, so they're readily turned into buttons or hotspots. If you need graphic shapes that can't be created using

the tools supplied, it's easy to import them. However, if you have a diagram and wish to turn its components into arbitrarily shaped buttons or hotspots, your choices are either to divide the diagram using an external application, import the pieces separately, and assemble them in ToolBook; or to fashion invisible buttons in ToolBook that approximate the shapes you need and lay them over the diagram.

Once you've explored the system's resources fully and become familiar with basic operations, you'll find it easy to use for projects that require only static objects. Much of this ease is due to the inclusion of *widgets*, or prescribed objects and object groups. These include various buttons, fields, and graphical elements as well as more complex structures such as media players (starting with Multimedia ToolBook) and multiple choice questions (in CBT Edition). As you browse through the pop-up WIDGET CATALOG (see Fig. 3), informative text appears at the bottom explaining the function of each widget. To incorporate one, simply drag it from the Catalog into your application. A hotlist helps you locate the widgets you find most useful and, of course, you can add your own.

Certain elementary dynamic events are also fairly simple to generate, though it may

TOOLBOOK 3.0 CBT EDITION

not be obvious how to go about it. For instance, to create a simple path animation, you'd start by selecting the object you wish to animate (say, a button that, when clicked upon, flies around the screen). From the TOOLS menu, select PATH ANIMATION and draw a path in the resulting dialog, then close the dialog and accept the default name for the path, "animation 1" (the path is now an attribute of the button). Open the button's script window and type:

```
to handle buttonClick
    send playAnimation
end buttonClick
```

Then select UPDATE SCRIPT & EXIT from the button's own FILE menu (or click on the redundant icon) to exit. Toggling to reader mode, you can click on the button and watch it whiz by.

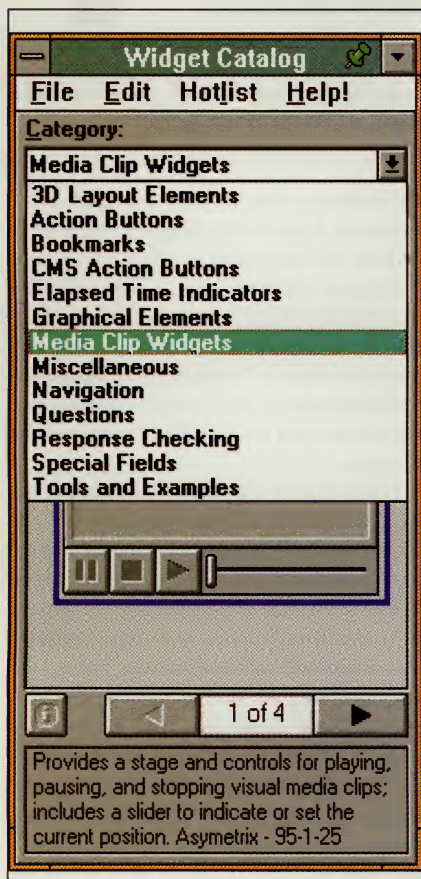


Figure 3. The Widget Catalog is a library of widgets, or prescribed objects and object groups, ready to be dragged and dropped into your projects. As you browse through the Catalog, informative text appears at the bottom explaining the function of each widget.

ToolBook affords further dynamic options via two techniques that Windows provides for sharing data among programs: object linking and embedding (OLE) and dynamic data exchange (DDE). Using OLE, your books can incorporate objects created in other Windows programs (embedding) or call the original programs themselves to manipulate the object (linking). Among other things, this enables you to use a spreadsheet program to add math capabilities to your project without writing calculation scripts. Accomplishing this is fairly simple. Select INSERT OLE OBJECT from the EDIT menu, choose the appropriate application/object type, and select the object. In reader mode, when the user clicks on the linked object, ToolBook will launch the program in which it was originally created.

Using DDE, the contents of your books can change automatically as the underlying data changes. For instance, if you include a graph produced by a spreadsheet program, a DDE link will update the graph automatically every time new numbers are entered in the spreadsheet.

You can do a great many things with the ToolBook base, but virtually anything that involves motion or change — including transitions between pages — involves writing code using the built-in OpenScript scripting language. OpenScript provides a great deal of power, but not without a price. As a result, authoring in ToolBook can be complicated and may take some time to get used to. I have a few bones to pick in this department — but I'll save them until we've completed the ToolBook tour.

Incorporating Multimedia

Multimedia ToolBook adds audio and video playback capabilities plus external utilities for editing audio (WaveEdit for basic cropping, volume change, and fade-in/out functions) and video (DVP, which we'll get to in a moment). But before you can incorporate audio, video, or even imported still images into a book, you must register them with the Clip Manager (a dialog box called by clicking the appropriate icon or selecting CLIPS... from the OBJECTS menu) and entering appropriate information in the Clip Editor dialog (see Fig. 4). For ToolBook's purposes, a *clip* is a reference to a segment, defined by start and end points, of a media element. Only the reference is incorporated into your application — the data itself continues to reside in its original location. This simplifies some tasks, such as presenting varying segments of a single source.

Although you must specify the start and

end points of an audio or video clip, there is no provision for moving video one frame at a time for precise editing, so it takes some trial and error to get things exactly the way you want them. A better option is to use the system's most impressive external utility, Digital Video Producer or DVP (see Fig. 5 on page 70).

In terms of features, DVP is a strong addition to Multimedia ToolBook. I did, however, manage to lock it up twice. It displayed the informative text INTERNAL ERROR, and clicking OK in the message box simply caused it to be redisplayed. After a dozen or so clicks it began to sink in that this message wasn't going away, so I pressed CTRL+ESC to force DVP down through the Windows task list.

With appropriate hardware, DVP can capture individual frames and full-motion video in AVI format. It provides two independent video players and enables you to position them visually for cropping, editing, fades, dissolves (at head and tail), and even effects such as ripples and color changes. You can add an independent soundtrack as well.

Having finished editing, though, you'll find that rendering is a slow process. On a 16MB Pentium-90 with a 13ms hard disk running Windows for Workgroups 3.11, it took 20 minutes to create a new Indeo R3.12 file that represented a wipe transition between two five-second clips (captured at 24 frames per second of 240x180 pixels each for a little over 5MB each). When I changed the BUILD OPTIONS to render the clip without compression, DVP crashed with a Windows General Protection fault.

Restarting DVP and building the clip again without compression, the process went much faster — less than one minute, in fact. Unfortunately, the disk space required ballooned from two 5MB files to a combined clip of around 50MB! I tried to find a middle path by changing the compression from the default 65% of original quality to 80%, and DVP crashed again.

Gamely, I loaded it up again and tried a new build at 80%. DVP failed again. When I talked to Asymetrix technical support about this, they mentioned that they don't recommend the compression settings other than the default 65%.

Questions & Answers

Features specific to CBT Edition begin with a set of wizard-style *book specialists*. The specialists prompt you for your specifications (layout, page size, number of pages, number of chapters, user activity tracking, etc.) and generate ready-made book templates that include generic title pages, menu



Figure 4. The Clip Manager keeps track of the media elements incorporated into a book. In the Clip Editor dialog, you can specify a media file and playback start and end points.

pages, chapter headings, and content pages so you don't have to worry about creating the application's superstructure (see Fig. 6 on page 71). Books built by the specialists also contain objects such as buttons for leaving an application, navigating between pages, and so on, so you don't need to script these basic functions. Specialists are included for generic content, glossaries, and quiz books, as well as script examples to guide you in building your own specialists. They greatly simplify working with ToolBook as well as providing a great head start in developing CBT programs.

The staple activity of CBT is supplying the user with information and then asking questions about it. To this end, CBT Edition provides widgets for an impressive variety of question types. These include not only the usual true/false, multiple choice, and fill-in-the-blanks, but ready-made, prescribed layouts to test the user's ability to place graphical objects in the proper order, match text or graphics by drawing a line to connect related objects, and perform other similarly fancy tasks.

Most often, the hard part of creating an educational application is receiving and interpreting answers. Happily, there are also widgets for timing and analyzing responses. There's even support for fuzzy spelling to identify answers that convey the correct meaning but aren't 100% correct. (The question objects themselves

handle only the basics. They interact with the onboard Question Manager, which contains the intelligent routines.)

Feedback can take the form of displayed text, playing a media clip, or branching to a different place in the program. One reason to branch is to customize your presentation. If a user specifies his age as 30 or less, you might ask questions about Pearl Jam; if over 30, you might ask questions about the Police. And, of course, you can always write your own scripts for other types of feedback.

Helpful CBT features are built into the book specialists as well. For instance, the quiz book specialist allows you to specify whether questions should be posed in a specific order or randomly for a different quiz each session.

Perhaps the most powerful addition is the Course Management System or CMS (see Fig. 7 on page 71). CMS controls access to courses and tests and also tracks student progress. CMS can operate across a LAN to track multiple students at various sites. Password security enables you to assign specific access and modification rights to each login name you authorize to use the system. Individual courses or books within a course can have additional passwords for even tighter security. By assigning a password to a book, registering it with CMS, and keeping it secret, you can ensure that clever hackers can't use ToolBook to sneak into a book for

TOOLBOOK CBT EDITION

Description

Highend interactive multimedia authoring software for Windows.

System Requirements

Windows 3.1 or later; 386 or higher; 20MB-250MB on hard disk (depending on setup options); 8MB RAM (12MB recommended); VGA, Super VGA, or other Windows-compatible graphics card.

Features

Book/pages metaphor with multiple simultaneous windows; broad assortment of tools for creating and editing media elements including text, graphics, audio, video, menus, cursors, and palettes; mix font sizes, styles, and colors within a single text field; book specialists (customizable project templates) including tests of various kinds for CBT; widgets (customizable pre-scripted objects and object groups) including several question types for CBT; networkable multiuser course management system; OpenScript object-oriented scripting language; Auto-Script scripting coach; script debugger; calls to external code modules via DLLs; calls to other Windows applications via OLE; Save optimizes files for CD-ROM; Setup Manager utility creates installation diskettes for distribution; authoring courses available from authorized training facilities.

File Support

Audio: .wav, .mid, .rmi, CD audio. **Video:** .avi, .mov, .pic, .jpg, .mpg, videodisc, videotape. **Images:** .rle, .wmf, .gif, .tif, .pcx, .bmp, .dib, PhotoCD. **Animation:** .fli, .flc, .mmm.

Suggested Retail Price

\$1,295. One-year technical support contract \$295 (first 60 days free).

Contact

Asymetrix, 110 110th Ave. NE, Ste. 700, Bellevue, WA 98004-5840; vox 800.448.6543, 206.637.1500; fax 206.637.1504; email techsup@asymetrix.com; BBS 206.451.8290. Reader Service #201

which they aren't authorized. They can only get to course materials through CMS.

CMS keeps all information pertaining to your courses in relational database tables (Paradox 4.5 format) for further analysis and processing. Tables are provided for tracking courses and their enrollment, individual books and their passwords, information about students and administrators, and student activity including completion status and scores. The tables can be encrypted for further security.

Script-Intensive Authoring

While CBT Edition's book specialists and widgets make it relatively easy to build many standard (and some not-so-standard) capabilities into your applications, many interactive designs are bound to demand functions that aren't addressed by them directly. When this happens, you'll find yourself knee-deep in OpenScript.

OpenScript is more English-like than, say, C++, but it's still an object-oriented language. Despite the fact that certain functions are more user-friendly, it requires you to know nearly as much about object orientation as does C++ — and if you know that much about object orientation, you probably already know C++. Furthermore, it's a new language, and with so many other fine languages in existence I don't like having to learn a new one.

The tutorial found in the Multimedia ToolBook user manual prepares you for this by focusing on the specific programming skills you need to master. In doing so, it con-

veys the sense that this is an object-oriented development tool rather than a multimedia presentation environment. Both styles have their place — but, despite the presence of high-level scripting aids, there's no doubt which side of the fence ToolBook stands on.

For example, in order to have a graphic, called *image* in this example, resolve into a screen gradually (the opposite of dissolving out of it), Asymetrix suggests the following commands:

```
get lockWindowUpdate(sysClientHandle)
show group "image"
get lockWindowUpdate(0)
—Suspend messages to prevent infinite loop
sysSuspendMessages = true
transition "dissolve" to this page
```

The focus on coding continues in the on-line help. For example, when trying to figure out how to create a gradient pattern, I selected COLOR DIALOG BOX from the help index, assuming that it would tell me how to use the dialog box to modify an object's colors. Instead, I was told how to insert the *choose-ColorDlg* function into OpenScript routines.

The difficulty is compounded by OpenScript's unusual control structures. This is illustrated by the following set of instructions from the tutorial:

```
to handle buttonClick
  if checked of button "1" = true
    checked of button "1" = false
    go page "Correct"
  else
    checked of button "2" = false
    go page "Incorrect"
  end
end
```

I indented the code to provide a visual cue, but if I hadn't done so, would you assume that the *go* instructions are part of the *if* and *else* groups? Programmers are deeply ingrained with the practice of using *do* statements or curly braces to indicate that both of the instructions beneath the *if* and *else* must be executed if those conditions are true. OpenScript's structure forces you to code *else* and *end* statements to terminate the block.

To be fair, OpenScript has its virtues. For one thing, among its functions is a spell check that looks at all text including button names — something every authoring sys-

PROS AND CONS

Pros

Template-style facilities (book specialists, widgets, script libraries, sample apps) provide ready-made functions that are easily incorporated into ToolBook applications; templates for several types of questions and answers are provided; tools for creating and editing media elements are more complete than those in competing systems; Digital Video Producer provides advanced video postproduction functions; networkable, multiuser Course Management System tracks student performance and limits access; files are automatically optimized for CD-ROM when you save.

Cons

Beyond template-style facilities, the learning curve becomes steep; virtually all authoring requires some scripting, and authoring dynamic objects requires nontrivial scripting; OpenScript conventions differ unnecessarily from those of common programming languages; stability problems were observed during the review process; providing separate user manuals for ToolBook, Multimedia ToolBook, and CBT Edition makes the information contained within them relatively inaccessible.

Bottom Line

CBT Edition is an uncommonly capable system but requires an unnecessarily high degree of commitment from the user.



Figure 5. The Digital Video Producer (DVP) provides video capture functions and two independent video players. This allows for cropping, editing, fades, dissolves (at head and tail), and even effects such as ripples and color changes. You can add an independent sound-track as well.

tem should have, though no other does. The ability to define user variables is a powerful one. User variables retain their values between sessions, so you don't need to worry about saving and restoring them. For complex data management needs, arrays are supported, and a good set of control structures is included, such as *if then*, *conditions* (same as case or select statements), *do until*, and *do while*. Programming in a graphical environment is based on messages, and OpenScript incorporates this technique handily. You can define your own messages, send them to objects, and create handler routines to process them. You can also link scripts to external Dynamic Link Libraries (DLLs) and call them for additional functionality. (Useful DLLs are available from many suppliers of development tools and can be programmed in C, C++, Pascal, and other languages that support this function.)

The Debugger is an excellent tool for evaluating scripts. Also, the Command Window, which allows you to execute individual commands immediately and observe their effect, is a great enhancement to development and debugging.

Scripting Alternatives

To make scripting easier, an Auto-Script tool is provided (see Fig. 8 on page 72) in the toolbar for individual objects. I used it to write an *object event handler* (a set of instructions that defines an object's response to a user input). But when I returned to Auto-Script, the steps I had created weren't there. When I recreated them and tried to save the new instructions, I received a message that the handler already existed and finally was allowed to see my old code! (Furthermore, although I had invoked Auto-Script from the pop-up menu of a *stage* — the screen object within which a video is viewed — I had to select the specific stage I wanted from a list. The one I had started from wasn't the default.)

While Auto-Script does shield users from some of the messier aspects of coding, it isn't exactly a piece of cake itself. I found that the steps required just to add a simple dissolve from one page into the next, while they may be simpler than writing code, are unduly cumbersome.

Another alternative is to create scripts by capturing your own actions, as though you were recording a macro. Simply select an object, select START RECORDING from the EDIT menu, and manipulate in whatever ways you desire (your actions are stored in a buffer). When you're finished, select STOP RECORDING, right-click on the object

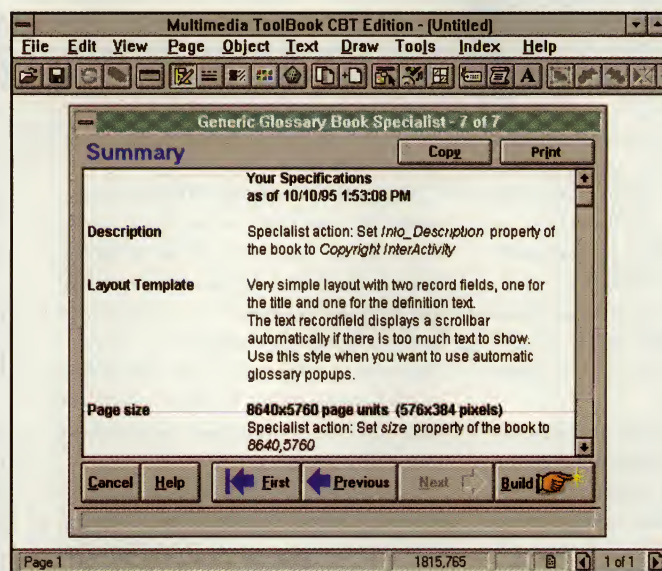


Figure 6. Book specialists prompt you for your specifications (layout, page size, number of pages, number of chapters, user activity tracking, etc.) and generate ready-made book templates that include title and content pages, navigation buttons, and other standard features. Specialists are included for generic content, glossaries, and quiz books.

to pop up its own menu, open its script window, and select PASTE RECORDING from the object's own EDIT menu. Update the script and exit, and you're home free — maybe. While this proved a serviceable method for creating path animations (but don't forget to change the words "the selection" in the script to the actual name of the object so that other selected objects don't move instead), other operations didn't quite happen the way I expected. Specifically, getting a button to create a new but-

ton turned out to require much more than simply recording as I drew a button.

Stratified Documentation

The stratified nature of Multimedia ToolBook CBT Edition doesn't necessarily pose a problem, but the stratified nature of the documentation does. If you want to look up a particular feature, you must decide whether to start with the ToolBook manual, the Multimedia ToolBook manual, or the CBT Edition manual — and even then you



Figure 7. The Course Management System (CMS) controls access to courses and tests and also tracks student progress. CMS can operate across a LAN to track multiple students at various sites. Password security enables you to assign specific access and modification rights to each login name you authorize to use the system.

TOOLBOOK 3.0 CBT EDITION

may not find it. Fortunately the online help is extremely well indexed (if not entirely complete). Rather than consulting reference materials, you'll do best to search out and familiarize yourself with everything that comes with the system — manuals, online help, instructional ToolBook books, sample applications, templates, libraries, utilities — to make the most of ToolBook.

The manuals have other problems as well. For instance, the walkthrough in the Multimedia ToolBook manual doesn't match CBT Edition. When adding a new background, the user faces a couple of new dialogs that don't appear in the book. These tutorials are designed specifically for neophytes — the worst place for such preventable problems.

Actually, there's a more serious problem in the walkthrough. The user is directed to name two buttons on a page "1" and "2" respectively, although, as illustrated, the text on the buttons says "Show a Video" and "Done." To handle the events generated by pressing the buttons, the user is asked to enter the code:

if checked of button "1" = true

Any programmer knows that the use of such vague identifiers makes debugging nearly impossible. Since this button is labeled "Done," why not use a more indicative name such as Button_Done? Then checking

the status of button "Button_Done" makes much more sense, and budding programmers will develop skills of immense value in writing more complex code.

Conclusions

Multimedia ToolBook CBT Edition is an extremely powerful product. So is C++. So is a nuclear submarine. None is for the timid or the novice. All present a nontrivial learning curve. Once you're over that curve with CBT Edition, you'll find it a tremendous asset, particularly in the production of CBT applications. It's more complete than the competition and substantially more affordable.

I do have concerns about stability. During testing, I encountered several non-reproducible errors. With alarming frequency, ToolBook informed me that an unspecified Windows GDI error had occurred and that I should exit Windows as quickly as possible. Asymetrix suggests that this might indicate a problem with my video device driver. That's certainly possible, but I don't receive these messages running any other application including Quest, a multimedia authoring system that stresses the video device driver in much the same ways as ToolBook.

Virtually all multimedia authoring systems, at least in the present era, provide a finite array of canned functions with a scripting language to augment them as necessary. CBT Edition adds an in-between level of access in the form of widgets, libraries, the Auto-Script facility, and other template-style features — as well it should. However, to make the system

COMING SOON

By the time you read this, Asymetrix expects to be shipping Multimedia ToolBook 4.0. Planned enhancements include:

- Win95-style controls. (The new version, however, will not be native to Windows 95.)
- Automatic disabling of Win95 features when a book is launched under earlier versions of Windows.
- Support for Visual Basic controls, enabling code modules to be incorporated as though they were ToolBook widgets. This is the pilot program for a new plug-in architecture that will extend ToolBook via modules from both Asymetrix and third-party developers.
- Detection and repair of corrupt files during SAVE.
- Enhanced printing.
- Increased execution speed.

reasonably easy to operate, Asymetrix relies on this intermediate level to a much higher degree than you might expect. The result is a system full of redundancies, inconsistencies, and obscurities. You have to be ready to roll up your sleeves and get your fingernails dirty.

The broad assortment of templates certainly provides a lot of useful stuff that you would be happy to avoid programming in any system. And, if you're making fairly straightforward CBT, you might be able to use the Widget Catalog to avoid scripting almost entirely. And, no doubt, a large percentage of authors will find everything they need in Multimedia ToolBook CBT Edition. But you can be sure they'll work hard for it.

Brian Proffitt directed *PC Week* Corporate Labs before becoming president of *Visionary Research*, an independent consulting firm. He contributes to *OS/2 Magazine*, *OS/2 Developer*, and *PC Magazine*.

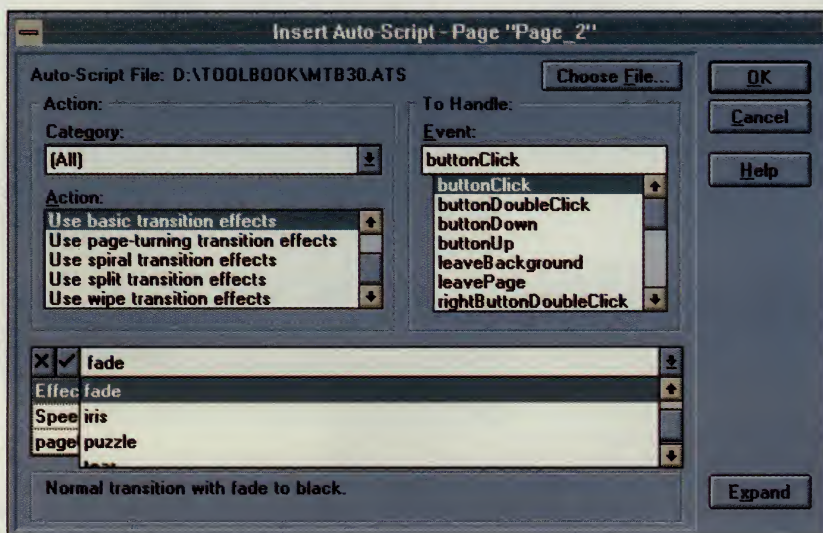


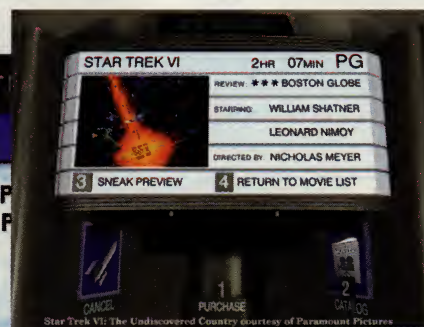
Figure 8. Auto-Script simplifies scripting with a point-and-click interface that generates commands and syntax appropriate to your needs.

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The GRP Collection, from N2K, Inc., combines a jazz music sampler featuring labels like Decca and Chess, with a catalog/order application. It was authored in OMO.



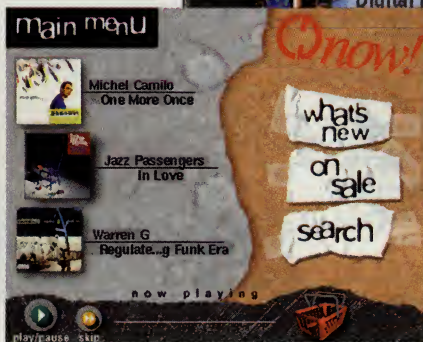
Logica Interactive Video Environment, for video-on-demand, was authored in OMO. Courtesy of Paramount Pictures.



With Personal News, viewers can customize their own news service, and retrieve news from archives. It was developed in cooperation with CNBC, and authored in OMO.



CD-Now is a music catalog shopping application which allows users to preview, sample and purchase cassettes and CDs. It was authored in OMO.



Virtual Journeys, a language-learning program from Gessler Publishing Co., Inc. was authored in OMO.



Director is great for authoring CD-ROMs. So is Oracle Media Objects. But OMO is also the only tool which will let you author exciting applications that can be distributed across networks: from LANs to the Internet to ISDN and interactive TV. Director won't. And OMO allows easy access and manipulation of relational data. Director doesn't. Director costs about \$900. For a limited time, get OMO for just \$99*. Call 1.800.633.0726. Or download a *free* trial version at <http://www.oracle.com/>

To join our New Media Alliance developer program contact us at 1.800.633.0687 or via the Web at <http://www.oracle.com/>
*These prices are only available in the United States.



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Hosed!

High-performance options for pumping data between your computer and hard disk

BY CHRIS MEYER

Hard drives are central to CyberMotion's studio. Obviously, media elements must be converted into a digital format before we can work with them, so they reside on our hard drives in the interim. But in addition to serving as data reservoirs, our hard drives act as video recorders and players, and that requires much higher performance. As a result, we've learned more about SCSI cards, fast and wide drives, and disk arrays than we ever wanted to. I'd love to share what we've learned so far.

Garden Variety

If a disk drive is a data reservoir, the SCSI cable that connects it with a computer is a data hose. Extending the analogy, you can think of the SCSI chip or card in your computer as a data pump. Let's play with these concepts to explore how various parts of the system contribute to shuttling data between your drives and video card.

Obviously, the speed of the pump has a big effect on how fast data moves down the hose. The standard SCSI, IDE, or Enhanced IDE chips built into most computers operate at mid-speed; IDE is usually the slowest. SCSI is the most common choice for high-performance systems and comes in a few variations, each with its own performance characteristics. The SCSI 2 Fast variation is like having a high-speed pump installed. Most current hard drives can take advantage of a Fast interface, but computer manufacturers rarely pop for it since it raises the price of their wares, and few users need the extra performance (aside from tweeky digital video types, of course).

Speed limits elsewhere in the computer affect

how fully the pump can be put to use. For example, the CPU often has to attend to the transfer of each drop (byte) of data to and from the disk interface chip. So raw CPU speed — and how busy the CPU is performing tasks other than data transfers — determines how fast the interface runs. Since data usually needs to be moved to and from an internal video card as well, the speed of the bus it plugs into also places limitations on the effective data transfer rate. This is one of the reasons people are so excited about the PCI bus format that is becoming more common in both Macintosh and Windows PCs — it affords a much higher transfer rate than previous alternatives.

Such bottlenecks are the reason most high-performance disk subsystems use a dedicated SCSI card. These cards tend to support SCSI 2 Fast and have their own CPU onboard to manage transfers without bogging down the computer's CPU. Some video cards, such as the ADI Digital Magic, even build the hard drive interface into the video card, bypassing the host computer altogether.

Finally, a bigger hose transfers more data. The Wide SCSI variant is like having a hose that's twice as big. Data is transported 16 bits at a time rather than 8 bits, doubling the transfer rate. This requires special cables, often with 68-pin connectors instead of the usual 25- or 50-pin. It also requires a special "wide" hard drive that costs \$100 to \$150 more than the usual "narrow" version of the same model drive.

You can mix narrow and wide drives on the same SCSI bus, but be careful. If a narrow drive is last in the SCSI chain, even with a proper terminator, only half of the data lines will be terminated. This causes data errors — sort of like having a leaky nozzle on the hose, but worse.

Mixed Greens

Various combinations of reservoirs, pumps, and hoses can be assembled depending on your needs. The most common combination is to slap a SCSI 2 Fast card into your computer, connect it to a fast hard drive, and smile as your transfer rate nearly doubles. The nice thing about this is that it doesn't involve anything exotic in terms of file management software or disk formats. You can squeeze out a bit more performance by tweaking the SCSI card's setup parameters. In the past this required a lot of trial and error, usu-



ally resulting in a lot of anguish and gnashing of teeth. Fortunately, today many hard drive vendors specialize in desktop video and have already figured out the best settings for you.

Although the configuration described above



Chris Meyer is manager of technical research for Roland Audio Development. A self-avowed QuickTime Baby who bought a Video-Spigot, Hi-8 camera, and Premiere 1.0 as soon as they shipped, he also serves as resident tech for his wife's desktop motion graphics company, CyberMotion, in Southern California.

is probably good enough for capturing video to be used in a CD-ROM, personally I find it inadequate for creating broadcast-quality videotape. This may not seem to be an issue in multimedia applications, but with the growing possibilities for cross-marketing in various media, as well as ongoing improvements in and proliferation of multimedia delivery systems, it's a good idea to capture media elements at the highest possible quality. (It's also nice to be able to play back a proof of at least VHS quality for producers who may not be accustomed to the limitations of many multimedia formats.) If all this sounds sensible to you, consider investing in SCSI 2 Wide format drives and cards.

If we've managed to avoid technological exotica so far, we run smack-dab into it as we turn our attention to disk arrays. With an array, the data itself is spread across more than one drive. Since data streams are read and written in parallel, the hose and pump can operate at closer to full capacity. The most common arrays "stripe" the data across two drives. Beyond the second, each additional drive tends to yield only a slight increase in data throughput compared with the initial jump from one to two.

For maximum throughput, you might dedicate one pump and hose per drive in the array — expensive, yes, but combined with a fast computer equipped with a PCI bus, brutally effective. As technology evolves, this arrangement promises the capability to handle uncompressed video at rates in the range of 18MB/sec to 27MB/sec (see sidebar).

I used to be extremely distrustful of disk arrays. Every person I knew who had used one for desktop video had at least one horror story of a fatal, unrecoverable disk crash. Therefore, I resolved to sit out the great hard disk performance race until I could get throughput from a single card and disk sufficient for broadcast-quality video. The funny thing is, by the time such systems became available, disk arrays themselves had become stable enough that I was no longer wary of them. As a bonus, they've also become more flexible. We now use an array with every computer in our studio.

Combination Salad

As I mentioned last issue, we have three computers between the two of us, and we like to swap drives among them to split up the production and rendering tasks. One computer — a Power Macintosh 8100/110 — is our main video capture and playback station. It has a Radius Telecast and Sony UVW-1800 Beta SP deck connected to it via analog component video to make the most of our JPEG-compressed signal. It's connected to the main disk array, which comprises an ATTO Silicon Express IV (SEIV) card driving removable Conner fast and wide drives housed in a pair of ProMax cabinets.

The array software chosen by Conner and ProMax to stitch this setup together is Remus

from Trillium, which is very flexible. It doesn't care how the data is distributed across drives, cards, and cables. If it can see every part of an array, then it can access it. It also doesn't care if single non-arrayed drives are on the same physical bus as the drives striped together into an array. Not all array software is this savvy.

The 8100/110 usually has a two-drive array for video capture and playback, as well as two non-arrayed drives for data transfer (or playing back less demanding video, such as proofs), all connected to the same card. Since we use removable drives and cabinets, we can actually move data captured on an array to another computer without copying the data to an interim drive. This saves on both time and disk space.

Our second computer is a Macintosh Quadra 950 with an Apple PowerPC accelerator card inside. Since a spare card slot was available, we put an ATTO SEIV card in it as well, also connected to a pair of ProMax cabinets. We transfer drives, either singly or as striped array pairs, between the 8100/110 and 950 without any problems — it reads either way, although more slowly since the 950 isn't as fast internally as the 8100. (Those who have the Apple PowerPC card are probably aware that it has timing problems with some Mac models, resulting in drastically reduced SCSI throughput. Adding a faster pump in the guise of the ATTO card returns it nearly to its stock speed.) Once when we blew out an ATTO card — another story for another day — we connected the ProMax cases to the 950 with a special narrow-to-wide SCSI adapter cable, making sure the wide drives were at the end to ensure proper termination. Everything still worked, albeit at an even slower pace since the high-speed pump was gone.

Our third computer is another Quadra 950 with an Apple PowerPC card that doubles as my music workstation. It's full of cards, so there was no room for another ATTO. However, I could still connect it to the built-in narrow SCSI bus. In fact, 950s (and 8100s) actually come with two narrow SCSI buses as standard equipment, an internal and an external one. ProMax makes a cable-and-bracket kit that externalizes the internal bus. So if I need the throughput, I can connect the internal bus to one drive in an array and the external bus to the other — two thin hoses connected to two slow pumps, but better than having only one of each. This is the solution used by Data Translations in their Media 100 video system's HDR option. They use the two snappier pumps in, say, a Power Mac 8100/100 to maintain high transfer rates without requiring an additional SCSI card.

The bottom line is that disk arrays have gotten friendly enough to be treated like normal disk drives in a video or multimedia studio. Combined with removable drives and cabinets, you can even move arrays between computers,

HOW MUCH SPEED DOES UNCOMPRESSED VIDEO REQUIRE?

It is commonly said that playing uncompressed video from a computer requires a data rate of 27MB/sec. This figure is based on the supposition that a single 24-bit RGB frame of 640x480 pixels can be encoded in 900kB ($640 \times 480 \times 3 = 921,600$ bytes). Multiply 900kB by 29.97 frames/sec and you get 26,973kB/sec.

But there are reasons to question this figure. In the first place, video's native format is YUV, not RGB. A common digital version of YUV known as 4:2:2 uses 8 bits per pixel for luminance (Y) and half as many bits for each of the color difference channels (U and V). The result is equivalent to 16 bits per pixel rather than 24, which works out to 600kB per 640x480-pixel frame, or about 18MB/sec — quite a decrease.

We're not done yet. Professional systems that follow the CCIR-601 specification for digital video require 720x486 pixels per frame, suggesting a data rate of nearly 20.5MB/sec.

But some people feel that 8 bits per pixel for luminance isn't enough resolution for shadow detail. Also, the 16-bit-per-pixel YUV format doesn't quite cover the range of colors allowed by 24-bit-per-pixel RGB. So let's allocate 10 bits per pixel to luminance (again, with another 10 divided between the two color difference channels). This raises the necessary data throughput to roughly 25.6MB/sec.

What does all of this mean? If nothing else, it suggests that the holy grail of data throughput for uncompressed video — no matter how you define it — is even closer to marketable reality than you may have thought. ❧

an important breakthrough for productivity. As for that blown SCSI card I mentioned above, we're still sorting out exactly what happened. For the time being, let's just say that you should still power everything down before swapping drives. ❧

Special thanks to Charles McConathy of ProMax for his valuable contributions of information and fact checking.

Connecting Participants to Content: Five Styles of Engagement

BY ERIC JUSTIN GOULD

Drag, click, flick... press, roll, wait... wait... grab, jump, throw... Numerous kinds of interaction are available to interactive media developers seeking to engage an audience. Each has a unique feel and communicates a unique message. Yet despite such variety, the interface elements of many multimedia products fail to complement their content.

Conservative development teams favor tried-and-true interface components borrowed from desktop computing—which makes their products feel like productivity applications. Those willing to step out on the edge have a tendency to use novel techniques solely to be the first on the block. Both run the risk of mismatching the message of their content with the style and at-

titude of the interaction techniques they employ. You can avoid this pitfall and make your products stand out by addressing interface style as an integral part of your overall designs.

A couple of years ago, Mike Powers of Petroglyph Studios and I were commissioned by Apple and IBM's Kaleida Labs to codify a set of design guidelines for their ScriptX multimedia development tool. In doing so, we defined five broad categories of interaction that describe almost any computer interface element. In this column we'll take a look at each category and how various kinds of interaction affect the user's relationship to the product. With this understanding, you'll be better equipped to choose the right set of techniques for your products.

Questions for Designers

Before venturing into design, it pays to consider a few key questions. Answering them will help focus your creative process and drive the style of interactions you create.

First, think about the people you're designing for. What is their primary activity? They may be studying, playing, browsing, watching, reading, searching, analyzing, or composing. What is their attitude toward their role in that activity? It may be passive and receptive, active and energetic, casual and rhythmic. Together these factors help you understand the audience's motivations and intentions.

Consider the person's environment and the technology being used. Are they in a public space, in an office, in their living room, or in the kitchen? What kind of hardware platform and hardware interface devices are they using? Do you envision them leaning over a kiosk's touch screen, holding a stylus and handheld computer, pointing a remote keypad at a settop box, or cupping their hand over a mouse, trackball, trackpad, or game machine's D-pad (directional pad)?

How about the general nature of the media you're providing? Is it fluid like a movie, chunked like a slide show, objectified like a set of building blocks, active like a game?

And what kind of relationship would you like to invite between participant and content? Just as literature presents first-, second-, and third-person perspectives, so do computer interfaces. How do participants identify with the content?

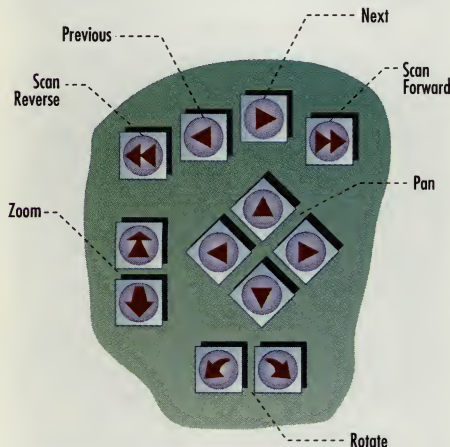
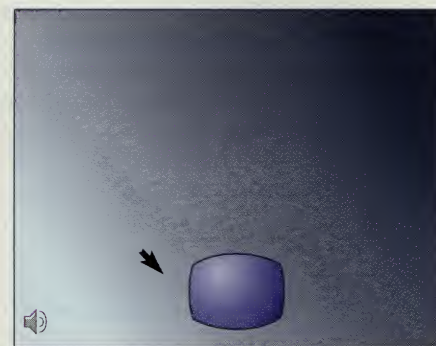


Figure 1. This interface for navigating among and manipulating images is a collection of discrete controllers.



Eric Justin Gould is the principal of MONKEY-media, a design and production studio in San Francisco. He is a dancer and a musician, holds degrees in cognitive science and interactive telecommunications, and is on the faculty at San Francisco State University.



Rolling the the cursor over the translucent TV tube shape brings up a continuous controller.



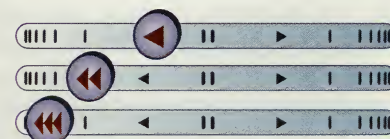
The cursor disappears as mouse interpretation is handed to the device, which reads horizontal change. (Rolling vertically releases the controller and reintroduces the cursor.)



Clicking the mouse button toggles play/pause.



When browsing or searching, sliding the mouse left or right controls the speed and direction of movement through time.



Leaving mouse in place plays video at that rate... (controller to fade after 1 seconds)

Figure 2. A software approximation of a video jog/shuttle wheel is a good example of a continuous interface.

FOUR OF A KIND

Never bet against a sure thing

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INTERFACE DESIGN

Are they interacting with the media directly, via the actions of a character or agent, or through a detached control device?

With these factors in mind, interface elements can be divided into five families — *discrete*, *continuous*, *concrete*, *character*, and *resonant* — based on the involvement they engender between participant and content. These are gross categories with some overlap, but interface elements falling into more than one family usually weigh most heavily in one. While any particular software interface can be made to accomplish almost any given task, you will enhance and direct the audience's experience if you choose interface elements that complement the content at hand.

DISCRETE interACTIONS

Common examples of discrete interface elements are buttons, panels, palettes, stamps, menus, and some cursor-based tools. The interactions in this family are extremely modal and work well with media that either comes in fixed chunks, such as pages, or exists in clearly delineated states, such as playing or stopped.

Discrete elements exist apart from the media itself and act on it irrespective of its meaning. Consequently, the user maintains a distance from the content, using, for instance, a cursor to act on a device which in turn acts on the media.

In terms of attitude, the participant is invited to have clear intentions, be logical, and expect results that are implicitly mapped to their actions. By pressing, clicking, poking, double-clicking, dragging, scrolling, and jumping, users can select, view, search, compare, document, present, and command. The media changes state as a result of their action. They are in control of the pace. Nothing happens unless they say so, and when they do say so, they get immediate feedback (if not the results they're hoping for).

Discrete interactions work well when each button has its own function. Mimicking a physical remote control with a software panel may make for a busy-looking screen, but it has the benefit of communicating clearly individuated functionality. Fig. 1 depicts a discrete interface for navigating among and manipulating images.

CONTINUOUS interACTIONS

Continuous interactions contrast sharply with discrete. Common interface elements in this family are scrollbars, sliders, and animated cursors for spatial or temporal navigation. They work well with media that flows, for example 3D panoramas, or is author-paced but elastic, like a story narrated in person.

The family of continuous interactions can also be considered third-person: The media controllers exist separately from the media themselves, and the participant respectively maintains a distance from the media. In continuous interactions, participants usually use a cursor to act on a device that acts on the media, or use a cursor that, when activated, directly manipulates the media. Because their motions map directly and fluidly to changes in the content, continuous controllers offer more opportunity for emotional and cognitive connection than discrete interactions.

In this style of interaction, the attitude of the participant is rhythmic and tends toward casual or experimental. Participants may not know exactly where they are going or what is happening, but they are able to explore safely and return smoothly to their previous location. They are in constant relationship with the media. By doing "nothing," they exercise as much control over the pace as by moving the input device. By rolling, gliding, moving, pressing and holding, drawing and flicking, participants can browse, explore, visualize, simulate, and perform. In fact, the pace of travel through the content or space



Figure 3. Grippy affordances, indicating that an onscreen object can be grabbed and moved, prompt concrete interaction.

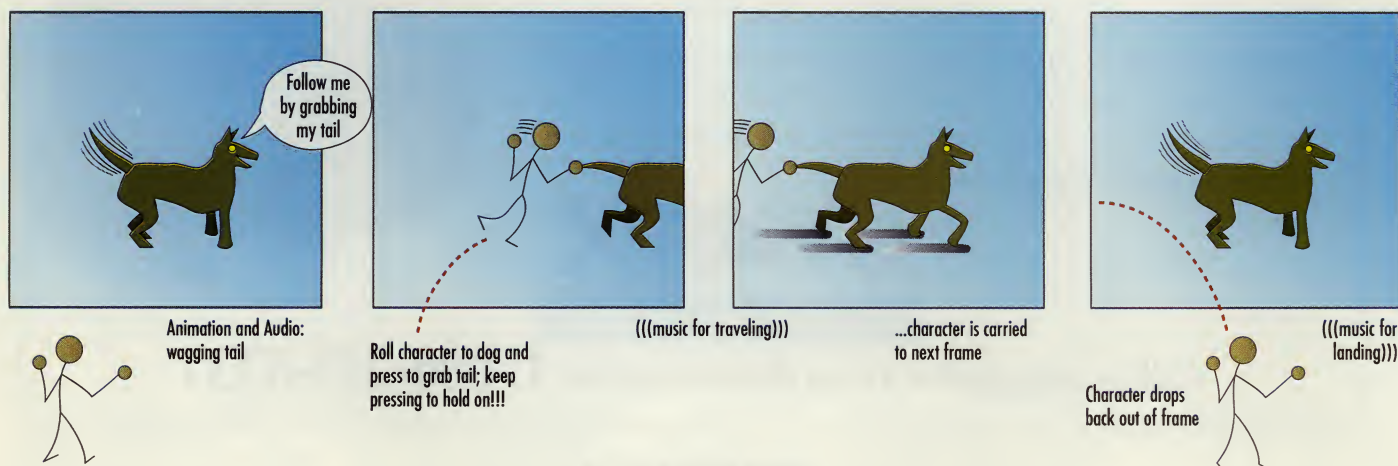
is primarily dictated by the author, but it is flexible enough to be intimately influenced by the participant. Fig. 2 illustrates an interface for continuous interaction with video media: a software approximation of a video jog/shuttle wheel.

CONCRETE interACTIONS

Concrete interactions provide a first-person perspective. The person becomes an *actor* who reaches into the content space with an extension of his or her body, such as a hand cursor, to manipulate content as though it were physical. Other common examples of concrete appendages include tools such as paint brushes, erasers, and smudgy fingers.

The interactions are metaphorically material,

Figure 4. Character interaction as a replacement for discrete navigational controls.



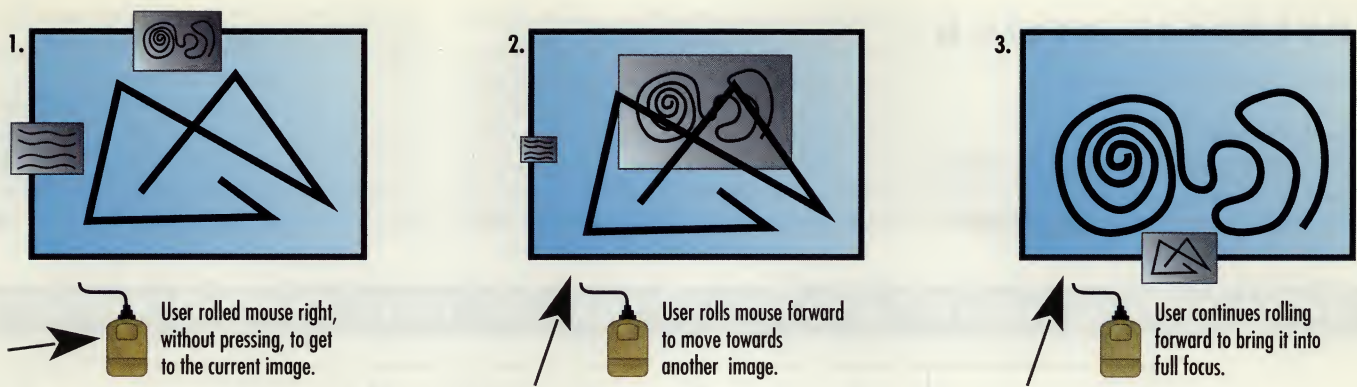


Figure 5. A resonant architecture for holding a montage of images.

physical, or corporeal. Animating and audifying them not only adds a nice touch but reinforces the physical metaphor. (Don't be misled by the hand cursor in Apple's HyperCard. It's just a pointer cursor in disguise because it doesn't necessarily allow concrete interaction.)

To create concrete interactions, the media must be objectified and directly manipulable. Either it is malleable, like a paint-type picture, or it affords interaction by being virtually tangible. It may be an object in the content space, such as a switch, a thing, or a container for things. Or it may be part of an object: a handle, knob, tab, dog-ear, corner, edge, surface, or hole.

When offering concrete interactions to your audience, it helps a great deal to let them know what they can grab. In Hands-On Technology's market positioning tool *Crush* we placed grippy affordances (like those little rubber bumps on Braun electric razors; see Fig. 3) on everything that could be grabbed and moved. The cursor turns into a hand when the user rolls the cursor in proximity of the grippies.

As in discrete engagements, concrete interface elements invite the participant to approach the content with clear intentions, but act on them in an explicit and kinesthetic fashion. Again, participants are in complete control of the pace. By touching, pulling, pushing, panning, tearing, stretching, smudging, grabbing, dropping, and throwing, they can construct, manipulate, organize, and design. Concrete interactions can be extremely satisfying because the actors affect their world directly.

Although the Macintosh Finder uses a standard pointer cursor, it embodies one of the earliest popular uses of a concrete interface with its drag-and-drop interactions for arranging file and folder icons. With smarter software, you can support richer experiences via proximity sensitivity, edge and surface detection, and simulations of friction and gravity.

CHARACTER interactions

In character interactions the participant is a *player* experiencing the world through, or with, a character who lives in the content space, often

by manipulating the actions of that character. Thus, character interactions are literally second-person. This style is often aimed toward children, in which case it relies on simple actions carried out with convincing animation. We may find, though, that a combination of concrete and character interactions proves useful in virtual spaces for all ages.

The content space in which character interactions take place — which consists of a storyline, other characters, objects, and environments — makes interactions of this type inherently more variable than those of other families. Unlike the discrete family, in which a given interface element has the same effect regardless of the meaning of the content it manipulates, character interactions vary dynamically with the character's situation. The specific attributes of characters and the things they meet determine the nature of their interactions. For example, the same D-pad controls for drawing a sword on an opponent may bring forth a flower in an encounter with a friend. Further, neither the sword nor the flower could be revealed had the character not previously picked them up.

Character interactions work well when the material is energetic, active, and relational, enabling the participant to become involved personally and intimately. Not only do children learn more readily in educational titles that employ character interactions, but they characterize their experiences as first-person rather than second. By running, walking, jumping, sitting, standing, following, listening, teaching, picking up, carrying, and using, people are encouraged to play, explore, learn, and express themselves. A storyline supports them in developing their character and playing out specific roles, possibly fighting, negotiating, or collaborating with other players. Fig. 4 shows how character interaction can replace discrete navigational controls.

RESONANT interactions

The fifth family I call resonant or algorithmic. A good example of this style is Laurie Spiegel's musical application, *Music Mouse*,

marketed during the mid 1980s. In *Music Mouse*, the player performs by rolling the mouse around on their desk, affecting a limited set of variables in the music. Another fun example is David Zicarelli's *OvalTune*, from the same era, in which the performer creates graphics and music simultaneously.

We've seen how discrete and continuous interactions maintain a distinct separation between interface and content. Likewise, in the concrete family, interactions and content can be isolated from one another. With character interactions the possibilities of engagement are tied to larger, more dynamic issues of theme and history. But in all these cases, the specific interaction techniques can be added after the media is created.

In resonant interactions, on the other hand, the technique of interaction is the framework for the whole experience. The interaction scheme must presuppose the production of both the media and the information architecture that holds it.

In resonant interactions, the content changes with the participant's movement or stillness (i.e., the amount of time spent in a particular locale). And manipulations of the media aren't necessarily associated with visible interface elements. So if there is no visible cursor or control device, the author may choose to supply additional feedback in the form of audio, an animated status area, or even text.

These interactions are inherently more complex than those in the continuous family because the media changes through time. Reversible flow — the ability to return to the way things were — isn't required. Pacing is determined by a balance between author and reader, who is invited to be perceptive, mindful, and acting on intuition. By listening, attending, waiting, rolling, pressing, expressing, and capturing, they may read, watch, hear, experience, express, feel, and share. Author and reader are both acting and communicating through the form of the content itself.

Because this family is complex and has many implications, I'll explore it in more depth in a future article. Fig. 5 illustrates a resonant archi-

INTERFACE DESIGN

ture for a montage of images.

Family Values


Grouping interactions into these five families should prove useful in at least two ways. First, it can help you select an interface style that re-

flects the overall attitude you want to convey in a particular piece. Second, it can help you envision alternative styles of interaction when the attitude or form of a piece is yet to be determined. You can use the table below as a quick reference to the characteristics of each family. Keep in mind that the designs you put out into the world affect the people who use them. Being

thoughtful about the interactions you employ will take you a long way toward developing coherent and engaging experiences.

In the next issue, we'll dive into the details of designing novel interface techniques. I'll cover a wide range of device characteristics and offer a brainstorming tool for rapidly inventing variants for any particular task.

TABLE 1. FIVE FAMILIES OF INTERACTION AND THEIR CHARACTERISTICS

FAMILY					
	DISCRETE	CONTINUOUS	RESONANT	CONCRETE	CHARACTER
Attitude	Intentional Implicit Logical	Casual Experimental Rhythmic	Mindful Perceptive Intuitive	Intentional Explicit Kinesthetic	Energetic Personal Relational
Activity	Select, View Search, Compare Document, Present	Browse, Explore Visualize & Simulate Perform	Read, Watch, Listen Experience, Express Feel, Share	Construct Manipulate, Organize Simulate	Play Explore Express
Perspective	3rd Person (Omniscient View & Manipulation)	3rd Person (Omniscient View & Manipulation)	0th Person (View & Act through Content Directly)	1st Person (Extension of Reader into Content Space)	2nd Person (Experience through Character)
Media Architecture	Fixed Chunks	Elastic	Thematic	Objectified	Active
Pacing	User	Author w/Viewer Influence	Author & Reader	Actor	Player & Author
Best Input Device (in order)	Remote Control All others (Joystick & D-Pad if modified)	Trackball, Mouse Game D-Pad Stylus	Trackball, Mouse Game D-Pad	Mouse, Trackball Stylus, Touch	Game D-Pad Joystick Keyboard
Actions	Press, Click, Poke Double-Click Drag, Scroll, Jump	Roll, Glide, Move Press & Hold Draw, Flick	Listen, Attend, Wait Roll, Press Express, Capture (Wear & Tear)	Touch, Click Pull, Push, Pan Tear, Stretch, Smudge Grab, Drop, Throw	Run, Walk, Jump Sit, Stand, Follow Learn, Teach Gain, Carry, Throw
Interface Elements	Buttons, Sliders Panels, Palettes Stamps, Tools, Menus	Slider Controllers Dual-axis Conductors Animated Cursors	Media Pace & Presentation Animated Cursors Custom Algorithms (Time Passage)	Animated Manipulators Hand, Tools, Icons Objects in Content Space Handles, Switches	Animated Characters Objects in Content Space
Element Position (re content)	Around; in Front of (Control)	Around; in Front of (Control, Influence)	Woven into (Influence)	Identified with (Directly Manipulate)	Inside; Integrated (Act, Behave)

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16	34	52	70	88	106	124	142	160	178	196	214	232	250
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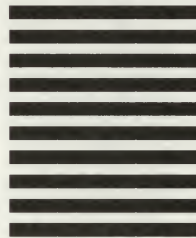
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Juggling Streaming Audio, MIDI, Animation, Graphics, and Video in Memory-Limited Systems

BY DAVID JAVELOSA



Thinking about when and where to use various types of sound and music in an interactive project involves more than artistic considerations. You've got to take into account the technical limitations of the delivery platform, be it a soundcard or General MIDI module-equipped Windows machine, a Mac, a standalone game box such as a Sega or Nintendo, a settop box, or whatever.

Let's look at how music engines such as the sample-playing Director script I described back in the July/August issue might be applied in an interactive project with real-world delivery system constraints. Assume, for our purposes here, that the visual images our audio is designed to accompany are fairly static. On the artistic side, you don't want to create confusion between what you're seeing and what you're hearing. It's very easy for even subtle background music to clash with visuals that move. Likewise, overly dissonant, highly active music could demand more than its fair share of attention.

You'll recall that our Director-scripted music engine used looping accompaniment patterns over which sampled "hits" (sound effects, musical phrases, flourishes, etc.) were



David Javelosa is on faculty at UCLA Extension and at SFSU's Multimedia Studies Program. Formerly Senior Music Designer for Sega Studios, his recent work includes projects for Marvel, Viacom New Media, Parker Bros., Disney Interactive, and a performance piece about the Oklahoma City bombing.

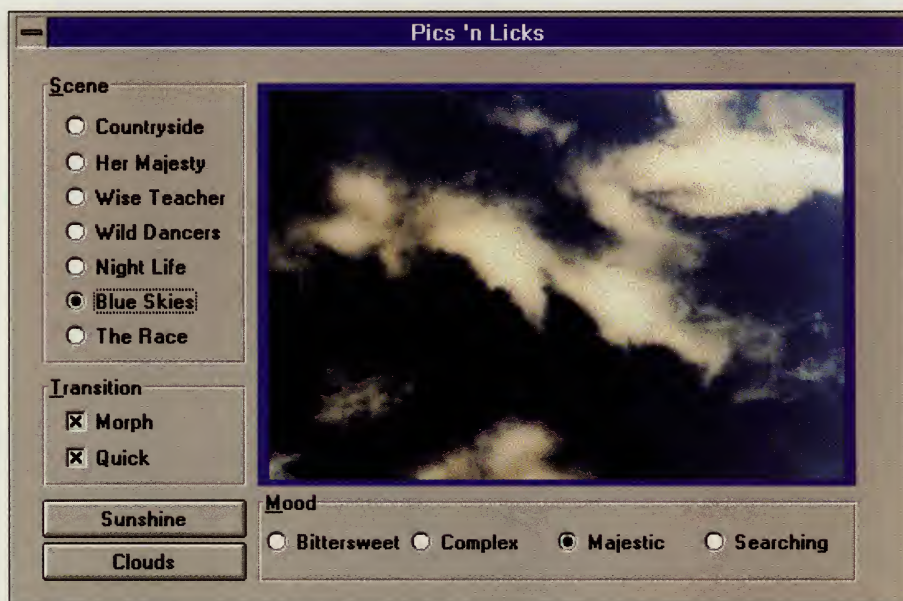


Figure 1. Pics 'n Licks lets you pick a mood or scale, and the selected mood modifies the scene.

triggered in conjunction with onscreen events. Nonpitched events, say percussion or machine noises, work well if they don't bear any relation to your loop's tonal center. If you want to use spoken words or other vocal sounds in either your loops or hits, and there's a text dialog going on, choose your samples carefully. For example, if you're accompanying onscreen bios of characters in a mystery game or historical figures in an edutainment product, watch out.

One effective use of our music engine would be to design a different thematic loop for each character, allowing the length of the music to be determined by how long it takes the viewer to read the onscreen bio, soak in the art, or get tired of the music (which would never happen, right?). Because the hits play randomly over the loop, the user's ear never knows exactly which hit will be played next or when. By using one long sample and a handful of short ones, a seemingly endless piece of music is generated that uses only two channels of audio. To get even more mileage out of your loops, you use different sets of hits with each loop. . . . The combinations and possibilities are endless.

An excellent example of randomly generated sample play appears in Pop Rocket's *Total Distortion*. In a small segment of the game, you experience a beat poet spouting stream-of-consciousness rants. In reality, a Director script is randomizing a list of one-word audio files and scheduling them to be played in a sequence. The program also shows the text of the words and even plays a few bars of musical accompaniment. At the end of the session, the text is dated and displayed as a page of poetry. In this case the audio clips don't conflict with text or dialog because they're one and the same.

Not So Random: Intelligent Systems

It's common knowledge that game companies are working on methods to "schedule" musical (read MIDI) segments to create fresh accompaniments for game play. Randomizing segments of MIDI files really starts making the most of limited resources. Working with randomized segments requires a two-step compositional process. The first step involves preparing the segment materials, either composed in a consistent and complementary style or perhaps taken from

a pre-existing linear piece of music. The second step involves determining how the segments are scheduled together.

Shifting patterns in a linear fashion creates an endless through-composed form. If the segments contained different instruments of a band, they could be assembled in layers. You could create some interesting chord combinations depending on the content of the layered segments and the random element of the structure scheduling.

Blue Ribbon Software has developed a nifty system for producing this kind of self-arranging music. Some of you MIDI-heads may be familiar with the eclectic approach to sequencing found in their Bars and Pipes sequencer for the Commodore Amiga. Their Super Jam for the Amiga, Windows, and SGI actually starts blending styles and arrangements. Their latest release is Audio Tracks Pro. It's advertised as "the solution for multimedia producers who no longer want to hire composers!" The program is built on an engine called AudioActive, which allows the user to select from a musical database of styles, moods, and instrument combinations. Blue Ribbon emphasizes that this is not randomly composed music, but an exploration of musical possibilities based on precomposed elements. You can actually create your own elements for the database.

The AudioActive engine recently won a best-of-show award at Comdex. It's available for licensing to developers for inclusion in games, multimedia titles, and other software products. The demo includes two great examples that show how the engine can be applied.

The first, called Pics 'n Licks, offers a list of scenes, a photo, and an accompanying musical clip. The engine lets you pick a mood or scale — major, minor, happy, sad, etc. The selected mood modifies the scene. As the engine jams away on these elements, two event buttons allow you to interact with the musical action. In the case of "blue

skies" (see Fig. 1), the events are titled "clouds" and "sunshine." The buttons create one-shot flourishes in keeping with the current style and mood.

The other example, which really turned me on, was the Jackpot Jukebox. This is a simple graphic metaphor of a slot machine that can randomly choose from three databases of musical elements and morph from one element to the next. The elements are listed as Style (or rhythmic gestures), Personality (or modal structure), and Band (or timbral combinations). Some of the precomposed elements are quite entertaining and surprising. Some elements for each database include:

Style	Personality	Band
boogie	noble	devils/angels Appalachia funky
waltz	demented	ducks
new age	lonely	choir
chase	righteous	sax
dance mix	funky	gnarly dude

I have yet to get my hands on the developer's kit, but you can bet some pretty cool products will emerge once people start using it. This type of plug-in engine gives programmers access to functionality that would have taken a product's entire development cycle to build. The engine can reside in a very small amount of space with low impact on the CPU. Working with a MIDI composer to build a database, those of you who are programmers can add self-arranging music to a number of different kinds of products, from screen savers to multimedia construction kits.




You Can't Do That!

Overall, the name of the game is juggling streaming audio, MIDI, video, and animation within a plethora of possible delivery systems' memory limitations. In the case of our Director example, given enough RAM, the randomly generated music could continue uninterrupted while different visuals are presented. Adding animation and other similarly large data loads such as streaming video will have an impact on performance. So, for example, the audio channel of a QuickTime movie will lose its ability to play both samples and music simultaneously. Add so-called CD-quality audio to the equation and you get into a serious data juggling act.

A common misconception in the video game industry is that because you have CD-ROM as a delivery system, you can have CD-quality audio to go with the graphics. I've seen many faces fall on producers and composers alike when a programmer tells them, "Sorry, that's not going to happen." The head on a CD player can read only one kind of data at a time. What we think of as "CD audio" is a specific type of data (Red Book audio) sampled at 16-bit resolution, 44,100 times per second (44.1kHz).

All the other data, graphics, animation, MIDI, samples, sound effects, and digital video are stored in another format loosely referred to as Yellow Book. The two formats can happily co-exist on the same CD, but they must be read at different times. To hear Red Book audio and see Yellow Book graphics or video, you've got to structure your program to load all the Yellow Book data into memory before you play the Red Book audio from the disc.

For low-memory, side-scrolling, arcade-style games, this "load everything to memory before anything happens" approach works well. But at the end of each game level, there is always that dark silent pause while the drive's head loads data for the next level. This happens in even the most modern game machines.

Next time we'll talk about covering up those silences and the specific memory limitations of various game engines. 

CORRECTIONS

The code that appeared in our September/October issue in the first column on page 91 got cut off from the right and wrapped around the line wrong. The code should read:

on enterFrame

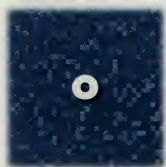
if ((the ticks) mod 30) = 0 then puppetSound HitTheLoop()
end

on exitFrame

go to the Frame
end

Displaying QuickDraw 3D Objects Using the 3D Viewer

BY JOHN WORTHINGTON



Once again, it's time to play the high-tech industry's favorite game — good news and bad news. The bad news first? Okay. Computers have just gotten fast enough that people will expect your programs to have flashy 3D graphics. Everyone has seen *Doom* and *Marathon* and has read about the hot 3D accelerator boards.

Still trying to figure out digital video and bitmaps? Forget it. No realtime 3D graphics? You probably try to surf the net with a 300 baud modem, too.

Now that you're starting to have a panic attack about having taken basket weaving instead of matrix algebra in college, the good news. Software libraries like Renderware and QuickDraw 3D do almost all the hard work for you. (See also "Affordable Realtime 3D: Truth or Fiction," *InterActivity*, July/August 1995.)

During a quick sprint across the exhibit floor of Siggraph '95, I picked up a copy of Apple's new book, *3D Graphics Programming with QuickDraw 3D*, which includes a CD-ROM containing QuickDraw 3D, programming examples, and some sample models.

It's hard to believe that only seven years ago I was on the development team of "Pencil Test" — Apple's first Siggraph entry and the first large 3D animation piece produced entirely on Macintosh computers.

Back in those dark ages, we had to write almost all the software we used. In the end, the final rendering of a three-minute piece took more than two weeks on a network of 20 Mac II computers. Today, you could do it with off the



John Worthington is the founder and president of MojoSoft, a company specializing in multimedia technology and development. In his misguided youth, he wrote the Macintosh MIDI Manager and was the project leader for QuickTime. His most recent project is the MusicNet CD-ROM.



The QuickDraw 3D viewer. The built-in controls let you direct the camera angle, object distance, object rotation, camera zoom, and object position.

shelf software in less time on a single Power Mac.

Before we dig into things, a quick warning. QuickDraw 3D currently runs only on Power Macs. A Windows version should be out in early 1996. What about 68000-series Macs? They appear to be left out in the cold. According to the engineering team at Apple, the 68040 just doesn't have enough horsepower.

QuickDraw 3D Object Metafile

One of the key elements of QuickDraw 3D is a new file format called the QuickDraw 3D Object Metafile (3DMF). "Yech! Another new file format?" you cry. It's actually better than that, because QuickDraw 3D can take a 3DMF file and display it for you — you don't need to know anything about the file format.

Even better, companies like Strata, Macro-media, Electric Image, and Specular have already announced plans to support QuickDraw 3D and the 3DMF format. This should make it really easy to create 3D objects. Add a few small changes to your app, and you'll soon have 3D graphics on the screen.

3D Viewer

The part of QuickDraw 3D that displays the 3D graphics and lets the user interact with them is called the 3D Viewer. A viewer pane consists of a picture area containing the displayed image

and a controller strip containing the controls.

The built-in controls in 3D Viewer let you adjust the camera angle, object distance, object rotation, camera zoom, and object position. As with the Movie Controller in QuickTime, you can customize 3D Viewer based on the flags you pass when you create the controller. It's possible to do away with the controller strip entirely or just leave certain buttons out.

The 3D Viewer is a shared library — a code library that gets dynamically linked with

your application at run time. A good place to learn the ins and outs of shared libraries is the book *Inside Macintosh: Power PC System Software* (Reading, MA: Apple/Addison-Wesley, 1994).

As with any Macintosh add-on, you need to make sure 3D Viewer is installed and available before you call it. This saves frustration and angry phone calls from customers later.

The Apple documentation lists two ways of doing this. The first is the usual method of calling Gestalt. For those joining the party late, Gestalt is a system call you can query to find out about the system's capabilities.

```
long          result;
OSErr         gestaltErr;

gestaltErr = Gestalt('q3vc', &result);
if (result == gestaltQ3ViewerAvailable)
{
    //      3D Viewer is present
}
```

You can also check to see whether the address of the routine Q3ViewNew has been resolved. When your application is launched, the Code Fragment Manager looks for the shared libraries that are used by your application and links them. If the address of Q3ViewNew isn't resolved,

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then the Code Fragment Manager couldn't find the shared library.

```
if (Q3ViewerNew != kUnresolvedSymbolAddress)
{
    // 3D Viewer is present
}
else
{
    // give the user a polite error message
}
```

Once we know the 3D Viewer is available, all we need is a window to display the image in. The entire viewer pane needs to fit in the content area of the window. Note that this doesn't mean the viewer pane must take up the entire window. You can even put more than one viewer pane in the same window.

The easiest way to create a window is to use a resource editing program like ResEdit or Resourcerer to create a window resource and then use `GetNewCWindow` to display it. I'll assume we've already created a window that we can pass to the routine below. This routine fragment will create a 3D viewer that fills the entire window. If an error occurs, null is returned instead.

```
TQ3ViewerObject    myViewer;
Rect               myRect;

// get the window's rect

myRect = myWindow->portRect;

// create the new viewer object

myViewer = Q3ViewerNew(
    (CGrafPtr)myWindow,
    &myRect, kQ3ViewerDefault);

if (myViewer != NULL)
{
    // viewer was created okay
}
else
{
    // there's an error creating the viewer
}
```

If you wanted the viewer not to take up the whole window, then you could call `myRect` before it is passed to `Q3ViewerNew`.

The flags used to specify the appearance and behavior of the new viewer compose the third parameter of `Q3ViewerNew`. The constant `kQ3ViewerDefault` creates Apple's default viewer, which looks like the one on page 84.

We're almost there. Now we have to attach the data to the viewer. You can attach data from a file or from memory.

`Q3ViewerUseFile` takes the viewer we've created above and the `refNum` of a file. You get the `refNum` for a file when you open it.

```
theErr = Q3ViewerUseFile(myViewer, myRefNum);
```

If you have the 3D data in memory in the 3DMF object metafile format, then you can use it directly with the call `Q3ViewerUseData`

```
theErr = Q3ViewerUseData(myViewer,
    my3DDDataPtr, myDataSize);
```

As I mentioned at the beginning, 3D Viewer will handle all the usual user interactions with the displayed object. To do this, you need to modify the main event loop of your program.

```
viewerEvent = Q3ViewerEvent(myViewer,
    myEvent);
```

```
if (viewerHandledEvent == FALSE)
{
    // it wasn't a 3D viewer event,
    // handle it normally
}
```

That's about all there is to displaying QuickDraw 3D objects using the 3D Viewer. Next month, we'll dig into this a little further and look at how to manipulate the displayed object. ☛



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The Legal Side of Collaboration

Copyright Pools and Joint Works

BY CHARLES B. KRAMER

Creating interactive applications, like many other art forms, is a collaborative process. Someone with an idea and a few bytes of code collaborates for a while with one artist and later with another. A friend comments, "Great! But why not change the scene to a moon of Mars?" Puzzles, scenes, and stories are added, then changed.

Before the title reaches retail shelves, dozens of people may participate in the process: animators, experts on network drivers, and musicians. Each contributes, and each contribution may be influenced by one or more of the others. This process sometimes raises the question of what copyrights the collaborators own in the title — and what control over the title they may have as a result. When the collaboration is among employees the answer is usually easy: their employer owns the copyrights. The answer is similar when the collaboration is among independent contractors who each signed an agreement stating that the person who hired them owns whatever they create.

But the creative process does not start with employment or written agreements, and often at least one contributor to a title is not bound by them. So who owns what in those situations? In the absence of an agreement among all collaborators, the resulting project could be labeled a "joint work." When this happens, the answer to the ownership question and the consequences of that answer may be startling.

Joint Works

A joint work, in the words of the Copyright

Act, is a work prepared by two or more authors "with the intention that their contributions be merged into inseparable or interdependent parts of a unitary whole."

The "intention" required by the definition must exist at the time of creation. Such intention exists when someone creates a part of a work (like song lyrics for a theatrical musical) even if they do not know at the time who will create the other parts (like the script and music). In comparison, the intention does not exist when someone writes a poem intending it to be a poem, even if someone later adds music to create a song.

The definition also requires the parts to become "inseparable" or "interdependent." Inseparable parts exist when it's practically impossible to identify who was solely responsible for any particular aspect. This scenario is ordinarily true in the case of a novel or painting created by two or more people. "Interdependent parts," in comparison, are those that remain separately identifiable after they've been combined, like the music and lyrics of a song. Multimedia computer titles are typically prepared by a team of programmers, artists, and musicians who intend their computer code, artwork, and music to work together and form a title. When not employed or under the right sort of written contract, the members of such teams may be joint authors, and their title may be a joint work.

Joint works have the following legal attributes:

► **Each joint author can individually grant a non-exclusive license without the consent of any other joint author, subject to the obligation to account, and the obligation not to hurt the value of the work (both of which are discussed below).** If a programmer, artist, and musician create a joint work that is a game, for example, any one of them could license the game to a publisher. Since the licenses would be non-exclusive, a theoretically infinite number of publishers could publish the same game — which is a big reason why no publisher is likely to publish it.

► **Exclusive licenses can be granted only by all joint authors.** In the previous ex-

ample, the programmer, artist, and musician would all have to cooperate to give a publisher the exclusive right to the game. If even one abstains, the others cannot give an exclusive license.

► **Each joint author can also — according to some authorities — grant non-exclusive licenses to those parts of a joint work that another joint author created.** This means the artist would be able to give a non-exclusive license to use the game's music in another game, just as the musician would be able to give a non-exclusive license to use the game's art.

► **Joint authors who grant licenses or who otherwise profit from a joint work must "account" to the other joint authors.** The obligation to "account" for profits ordinarily requires joint authors to split their profits equally, even (according to some authorities) when they did not contribute equally. The joint author who writes all of a computer program except for a single subroutine, for instance, might be required to evenly divide profits with the author of the subroutine.

► **Joint authors must not exploit a work in a way that would hurt its value.** This means that a joint author cannot grant a license that would effectively deprive other joint owners of their ownership. A joint author of a computer program, for instance, almost certainly cannot independently release the program as shareware. This is because shareware distribution allows copying and distribution by everyone without permission (subject, in many cases, to conditions and exceptions), and would effectively deny the other joint authors from exercising any control over distribution.

To avoid the problems caused by the attributes of joint authorship, you generally want to avoid producing a product that's classified as a joint work. Avoiding joint works can best be accomplished by having everyone who works on a project enter a



Charles B. Kramer has practiced corporate, copyright, and trademark law in New York City since 1982 for clients in software development and other information businesses. He can be reached at interactivity@mfi.com.



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COVER YOUR ASSETS

written agreement with a company that will own the project before work begins. Different agreement terms apply to employees and independent contractors. Among other things, contractors should be forbidden from subcontracting, at least unless the subcontractors are also subject to an appropriate written agreement.

But be careful! You could easily create a joint work accidentally. Imagine, for instance, that nearly all of a title is created in-house by a development team composed entirely of employees. So far, so good: their employer owns what they create. But if the music is created by someone outside the team without a written agreement, the music composer and the employer may be joint authors. The composer would have a right to non-exclusively license the title and to share in any profits earned from the title by the employer.

Another common flaw in many collaborative situations is a failure to control the use of subcontractors. A contractor working under a proper written agreement could engage a subcontractor who is not working under one. If the subcontractor becomes a joint author, the title might be deemed a joint work, and the consequences that implies come into play.

However, establishing joint authorship is not so easy. For one thing, while someone can be a joint author without contributing as much as other authors, joint authorship requires a more than *de minimis* contribution. (*De minimis* is a lawyer's fancy way of saying "trifling" or "something so tiny that it may be ignored as though it did not exist"). Merely contributing a few lines of functional instructions for use in a help screen ("Press Q to Quit"), for instance, is not enough for joint authorship. Similarly, while writers and researchers collaborate in a sense, as do writers and editors, neither relationship ordinarily results in a joint work.

More important, most authorities believe that joint authorship requires contributing material that is protected under copyright laws. Among other things, this means that the contribution must consist of more than ideas. Several court decisions, for instance, have found that a joint work does not result when a person who hires a programmer describes the business needs and functions the program must fulfill, but writes no code. However, if that person provides something that is copyright protected — such as a long original prologue for a science fiction game ("The year is 2048 and you seem to have misplaced your neutron beam gun") — joint authorship might result.

Everybody into the Pool!

The major protection against the unanticipated consequences of joint authorship is to make certain that everyone who contributes to a title is either an employee or a contractor working under the right sort of written contract. But both arrangements usually provide for one company to own a title entirely. A solution that may prove more useful to an independent development team — at least one that does not want to incorporate and has noticed too late that it has created a joint work — is to create a copyright "pool."

The preamble of an agreement to create a copyright pool could start like this:

All of the parties to this agreement, and no one else, contributed all of the music, art, computer code, written text, and other parts of <a certain interactive title>. We are not entirely sure who among us is responsible for every particular part since many of us helped each other, and we all intended what we created to become part of the title. Accordingly, we enter this agreement to declare the title to be a joint work and we to be its joint authors with the following consequences. . . .

The idea is to bypass the question of who owns or created particular parts of a title by collecting all of the related copyrights. A copyright pool can also make clear that there is no outside person who can claim to be a joint author, because those in the pool — and "no one else" — are those who contributed.

Once ownership is centralized and clarified, the collaborators can focus on how profits, control over new versions, credits, and anything else they care about are to be divvied up. At a minimum, the pool agreement should make clear who has the power to grant exclusive licenses in the title as a whole. The agreement can also, among many other things, specify that a particular person has the sole power to exclusively license the music part of the title, or that certain decisions require the affirmative vote of two or more particular members of the team.

A pool can also apportion profits in any way the collaborators see fit. For example, some could get more of the profits from a computer title-to-movie deal than others, and others could get more profits from a license of the title's engine. Yet others could get profits only up to a certain dollar limit.

These sorts of decisions may not be easy, but the potentially unfair rules that apply to joint authors remain lurking for those who do not settle these issues first. 🐸

This column provides general information and not legal advice, which requires an evaluation of individual circumstances.

P. O. V.

Continued from Page 9

scheme rather than error diffusion dithering. Keep articles full of working-level insights like this one coming.

Chuck Jameson
Silver Tongue Software
via the Net

Interactive English 101

We were flogged mercilessly in the last installment of P.O.V. for our misuse of the word "enervating" (we meant energizing) when describing Disney's Aladdin location-based VR experience in our May/June '95 issue. This time, one reader voices a different point of view and another picks up where enervating left off.

Enervating is right! "Entertaining" is probably what was intended, and it is what they think they do at the Wal-Mart of entertainment when they spew forth wholesale and retail propaganda. When I took animation in college, one of the books required was *The Disney Version* by Richard Schickel, a critical look at the politics and machinations of Walt, the Disney Dude. As a non-fan I appreciate the unintended humor.

Keith Hunwick
Senior Tech Illustrator
StarSight Telecast

I read with interest your article "Milking the Couch Potato" in the Sept./Oct. 1995 issue of *InterActivity*. However, you committed a vocabularial crime in your use of "enormity" when you meant "enormousness." Really guys, you should know better. No? But then, a lot of people are becoming outspoken about the enormity of much of the entertainment coming from Hollywood and the major TV networks and cable services.

Clarke Echols
Learning Products Engineer
Unix Development Lab
Open-Systems Software Division
Hewlett-Packard Company
Fort Collins, CO

We'd take the 5th on this one, but the grammar police seem to be out in force these days. Technically speaking "enormity" means "excessive wickedness or outrageousness." But used informally, it also means "great size; immensity." Since this ain't no stinkin' academic journal, we try to write in a conversational tone (you don't see a lot of "whoms" in our prose), use boatloads o' contractions, break every rule in the book when it comes to hyphens, and in general hope our streetspeak is coherent. Guess ol' Webster's rollin' in the grave about now — forgive us. 🐸

[illegible]

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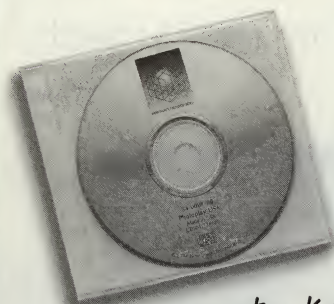
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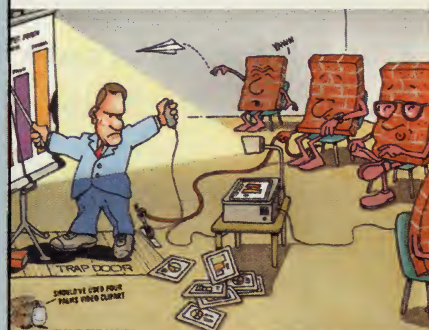
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Plenty of Space

How to Create Realistic Planets, Nebula, Solar Flares, and Star Fields You Can Fly Through

BY MARK GIAMBRUNO



If you're a sci-fi fanatic like I am, you've probably modeled a space scene at one time or another. Pretty easy, right? Just throw up a bitmap of a star field, build a nice smooth sphere, and slap a texture map on it. Maybe add a sun and top it off with a lens flare effect . . . voilà!

Gee, doesn't exactly compete with the latest ILM work, does it? The stars are static, the planet lacks atmosphere, and the whole thing really seems sort of dead.

Well, after spending 16 months toiling on the recently released CD-ROM adventure *The Daedalus Encounter* [see the case study in *InterActivity*, May/June '95], the 3D artists at Mechadeus have learned a thing or two about creating wide open space(s). Most of the work was done with Autodesk 3D Studio, but many of the techniques are applicable to any 3D program.

Creating Realistic Planets

In the opening animation of the game, a camera pans from a starfield onto a large, dusty planet with a blazing sun peeking around its edge. A few seconds later, three birdlike Terran Fighters enter the shot and the action begins in earnest. The task of building and animating this scene went to artist Bill Niemeyer.

Bill created the planet by making a large sphere in the 3D Editor module, taking care that the resolution was high enough to avoid any trace of faceting. Instead of mapping a painting of a ground texture onto the sphere, Bill applied a Yost Group IPAS routine called Smoke. It is one of several IPAS plug-ins for 3D Studio that give the program new features.

The Smoke IPAS is usually employed to duplicate the effect of smoke rising from an object such as a burning cigarette. But in this case,

Mark Giamb Bruno is the creative director of Mechadeus' first two multimedia titles, *Critical Path* and *The Daedalus Encounter*. He is also the author of *The Official Guide to The Daedalus Encounter*, which provides hints to the game as well as an extensive "making of" section.



Figure 1. Fighters battle near a procedurally textured planet.

Figure 2. Sunrise over Beta Trianguli Six (with de rigueur lens flare effect).



Bill applied Smoke to the sphere, creating a brownish procedural texture (see sidebar) that slowly swirled, like clouds of dust. To create the hazy atmospheric effect around the planet, he added three nested spheres over the top of the planet, each larger and more translucent than the last. This created the appearance of the haze dissipating into the outer atmosphere. To make the haze even more realistic, he applied a Blur IPAS to the three outer spheres.

The sun was simply a flat white disk set to be self-illuminated in the Materials Editor. Bill applied a Glow IPAS to the disk to complete the effect. But these days, you can't just render a glowing disk and call it a sun — you've got to add a lens flare.

A lens flare is the pattern of bright circles and rays seen when you point a camera lens at the sun or another bright light source. Bill used the Yost Group's Lens Flare IPAS to add the requisite realism and drama to the scene, furthering the

illusion that a real camera was used for the shot.

The Lens Flare IPAS was not applied to the sun object because it was too difficult to achieve the effect of the flare peeking around the edge of the planet. The effect was actually used on a tiny object that was positioned independent of the sun until the proper look was achieved. If your program doesn't feature a Lens Flare function, you could get the effect (with a bit of extra work) by loading the frames into Photo-shop and using its Lens Flare filter.

Star Fields You Can Fly Through

Another scene in the game called for the view through a cockpit window as a ship traveled through space. The best way to convey a sense of movement in that scene was to have the stars moving toward the ship and passing out of view, as when looking through the viewscreen in any given *Star Trek* episode.

One way to do this is by using the starfield

generator in Autodesk Animator Pro or a similar utility. A drawback to this method is that you're generally limited to a straight-ahead movement, with no turning or variation in speed. Artist Andy Murdock came up with a novel method, creating a cluster of simple stars in 3D Studio that a camera could be navigated through.



Figure 3. Opacity map applied to a single polygon.

Andy started by building a small square polygon and applying to it an opacity map of a filled white circle on a black background. This "trimmed off" the square edges of the polygon during rendering and left a white dot. The polygon was set to be a two-sided, self-illuminated material, so now the dot appeared to shine regardless of lighting. The problem with using a single polygon for a star is that if the camera is not positioned perpendicular to the polygon, the circle will be squashed or even disappear when rendering.



Figure 4. Three intersecting polygons make up a single star.

Andy solved this by duplicating the polygon two times and positioning the copies as shown in Fig. 4. The polygons were then attached to form a single object. The result was a simple three-plane object that appeared to be a self-illuminated star when viewed from any angle.

The next problem was distributing the stars. The bare-bones method would have been to

manually position a group of stars, scaling them slightly and perhaps adjusting the materials to create some variation. The group would then be duplicated and copied several times to create a field of the desired size and density.

Fortunately, the Yost Group's Scatter IPAS does this automatically, distributing hundreds of copies of the selected objects (in random sizes, if desired) over the exterior of any object that the artist defines. In this case, Andy applied the star objects to two large spheres and then deleted the spheres, leaving only the starfield. The resulting stars were combined into a single object for convenience.

The next step was to determine the camera path through the starfield, making sure it looked natural and deleting any stars too close to the camera. The starfield animation was rendered with Motion Blur activated to enhance the feeling of speed.

Using individual objects as stars allowed the camera to actually move through the starfield, instead of having the stars look as though they were stuck onto a background.

Inside the Nebula

In another scene, the camera flies around a spacecraft as it nears a binary star system located inside a gaseous nebula. The nebula was not as dense as the one in *Star Trek II: The Wrath of Khan*, but it illustrates that not all space scenes have to occur against a black and white background. The effect was created by artist Eric Chadwick, who started by obtaining Andy's starfield.

Eric created a large smooth sphere that fit mostly within the empty area inside the starfield. He reversed the normals on the sphere so that it would be visible from the inside, which is where all the animation took place. An omnidirectional light was placed in the center of the sphere to illuminate it evenly, then spherical mapping coordinates were applied to the object.

The colorful texture map was created by downloading an image from the Hubble Space Telescope archives via the Internet. Eric altered the image so that it would tile cleanly around the inside of the sphere, then applied the texture to the object. He adjusted the scaling of the map to make more of the texture visible to the camera at any given point and used a high contrast, grayscale version of the same image as an opacity map, which was set to SUBTRACTIVE

COOL TIPS

Rendering effect-intensive work like this can be very demanding on even the fastest systems. Much of the work covered in this article was created in layers, using alpha channel transparency, then composited using Autodesk 3D Studio or Adobe Premiere. A side benefit of this method is being able to tweak or add additional processing to a layer.

You may want to turn the ambient light in space scenes down or even off, since it makes the shadows and contrast on ships more dramatic and realistic.

Speaking of ships, we often used Photoshop to add a motion blur effect to the spacecraft when they first entered the frame. This added even more realism to the shot. The effect works best if the ship is fairly close to the camera and can be reduced, then dropped completely when it gets away from the edges of the frame.

to slightly obscure the stars beyond the sphere.

The result of this method was a realistic nebula and starfield combination that allowed a great deal of freedom in camera movement. The other aspect to this scene was the binary star, complete with a gaseous ring and solar flares. Let's look at how that was created.



Figure 5. The Artemis inside a nebula.

Sunspots and Solar Flares

Eric made extensive use of complex techniques to create the binary stars in *Daedalus*. To describe the procedure in detail would take an article twice this length. We'll examine the basic concepts, however, allowing you to get a head start and experiment with them to create



Figure 6. The Daedalus near the binary suns of Mizar.

your own custom look. For in-depth information on how the binary star was created, look for the upcoming book *3D Studio Hollywood and Video Effects*.

The binary star was made up of only a few objects; the real work was in the fine-tuning of the procedural textures and transparency techniques applied to them. Let's start with the cloud that surrounded the two suns.

The cloud was a couple of mesh grids that had displacement mapping applied to them, much as you would do to create a rough terrain model. The displacement map itself faded to black

around the sun locations and the outer edge so the mesh was flat at these points. The cloud used several maps (some subtractive) and the Smoke IPAS, and was mostly translucent.

The large yellow sun was a set of three nested self-illuminated spheres, each only 0.25% larger than the last. The innermost sphere was opaque and mapped with an animated yellow texture using — you guessed it — Smoke. This formed the basic fireball look of the sun.

The next sphere used Smoke to produce animated sunspots that appeared, disappeared, and changed shape constantly. Most of this

sphere was transparent, allowing the yellow surface to show through.

The outermost sphere used an additive Phong shaded texture that added a hot, bright look to the surface of the sun. Smoke was used as the opacity map to create the illusion of heat undulating on the surface.

The next undertaking was the solar flare effect, where hot tongues of flame appeared to radiate from the yellow sun. The mesh for this effect was three concentric disks, each centered around the sun and placed very close to each other. The disks were locked into this orientation around the sun spheres and tied to the camera so that they would always remain perpendicular to it.

The innermost disk, Flare 1, was the lightest color, being closest to the sun. It had an opacity map that made the disk's color fade out and disappear before the edge of the mesh. Smoke was used as a second opacity map to create the illusion of tendrils of fire.

Flare 2, the next largest disk, was similar to Flare 1, but a warmer color was used. Flare 3 was much darker and used a different opacity map, the falloff making the flares appear to burn off into space.

Warping Out

Coming up with new ways to create textures and effects is one of the things that makes 3D animation so interesting. That funny little utility included with your 2D paint or 3D package may be your key to creating an awesome or unexpected new effect.

In the next issue, we'll learn how to take your precious, lovingly constructed 3D models and blow them to smithereens. Debris, smoke, flame — it's all here, you twisted pyromaniac. See you then.

PROCEDURAL TEXTURES

Procedural materials like Smoke have many advantages and applications in 3D animation. A procedural texture uses mathematical algorithms to describe a texture and can be altered with a set of controls. For example, if you want to change a green marble with heavy white veins to a white marble with subtle gray veins, it takes only a few changes to the color and turbulence controls to make the change. The effect may even be animatable.


Procedural textures are very flexible and can be used to create unexpected effects. Their advantages over regular painted or scanned textures include:

- ▶ **Resolution independence.** You can get close to them without the texture appearing pixelated.
- ▶ **Automatic mapping coordinates.** Complex objects are easier to map, since the coordinates are automatically applied.
- ▶ **Animation.** Many procedurals can be animated, allowing the texture to change over time. Bitmaps usually require a looping animation

that may be noticeable if it is too short.

Procedurals have their drawbacks as well, so don't toss your copy of Photoshop just yet:

- ▶ **Sameness.** Procedurals, while flexible, have a certain sameness to their appearance.
- ▶ **Restrictions.** Since they are mathematically derived, procedurals are not capable of having discrete details, like fixed shapes or text, as painted maps can have.
- ▶ **Lack of distance filtering.** Some procedurals may sizzle at a distance due to a lack of map filtering. A blur effect may reduce this somewhat.
- ▶ **May not loop.** A procedural may not be capable of looping, which may be a problem in some nonvideo applications, such as multimedia products. You can probably use a crossfade to create the illusion of a loop.

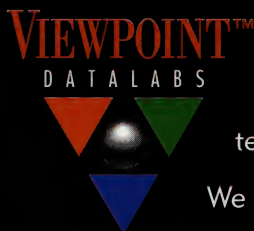


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